AUTOMOTIVE INDUSTRIES

A CHILTON PUBLICATION

FEBRUARY 15, 1959

Features • • •

Automotive Uses for Nickel and Its Alloys

New Engines at the National Motor Boat Show

Intricacies of the Air Force Thor Missile

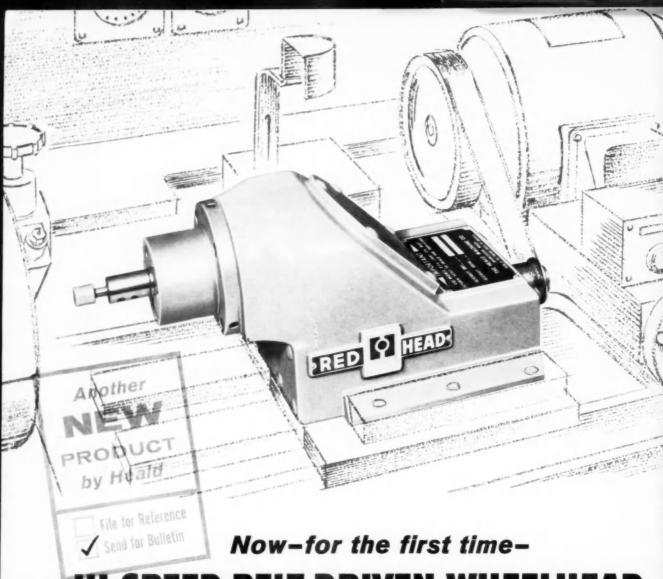
Special, Low-Cost Machines at J. I. Case Plant

Chassis Frame Made from High Tensile Steel

Volkswagen's Automated Production Lines

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Automotive and Aviation Manufacturing
ENGINEERING • PRODUCTION • MANAGEMENT



a HI-SPEED BELT-DRIVEN WHEELHEAD

for speeds to 100,000 rpm

THE NEW Heald Red Head Hi-Speed belt-driven wheelhead offers a practical, low-cost solution to the problem of getting proper wheel speeds for small hole work where high frequency generating equipment is not available. It provides speeds from 45,000 to 100,000 rpm with simple belt drive from a standard electric motor!

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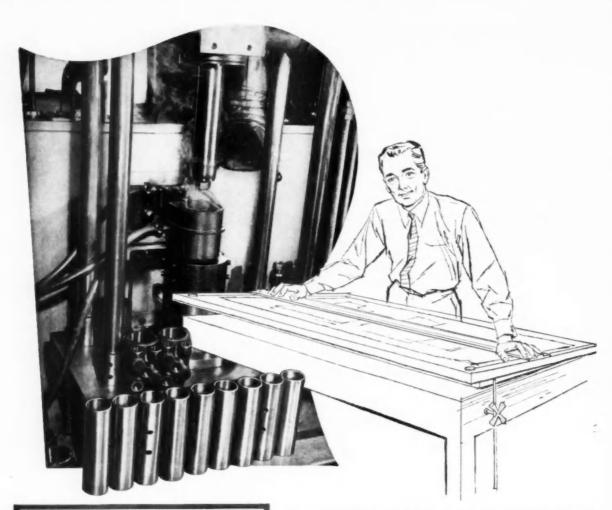
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AUTOMOTIVE

A CHILTON MAGAZINE . PUBLISHED SEMI-MONTHLY

FEBRUARY 15, 1959

VOL. 120 No. 4

Features • • •

▼ National Motor Boat Show

With public interest at a new high, builders continue to add new models to their lines of boats and engines. This year's displays reflected the trend toward V-type designs and more engine power, as well as greater use of fiber glass in boats. Page 52.

▼ Automotive Applications of Nickel

Nickel is fighting hard to stage a comeback in the automotive industry now that it is once more in plentiful supply. This year nickel usage is expected to rise to 6 lb per car from an average of 5 lb in 1958. Page 54.

▼ Special Low-Cost Machines

J. I. Case engineers have built many special high-production machines from used standard machines that were stripped to little more than the base casting. Page 61.

▼ Thor Missile Production

Some selected views of the Thor production line are given here, along with specifications of the propulsion system. Page 62.

▼ New Assembly Techniques

Ford engineers had to devise new handling equipment and assembly techniques for a new aluminum transmission housing weighing only 21 lb. Page 64.

▼ High Tensile Steel Frame Chassis

GMC's new line of heavy-duty tractors features a chassis frame fabricated from high-tensile sheet and strip stock welded together and weighing a fraction as much as a conventional frame. Page 65.

▼ Volkswagen Press and Welding Lines

Door panels are pressed and welded on six major production lines at Volkswagen's highly automated Wolfsburg plant. Second of two articles. Page 66.

▼ Dynastart Combines Starter and Generator

The German-designed Dynastart combines starter and generator, and operates in both directions. This eliminates need for a reverse gear on a two-stroke engine. Page 69.

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MAGAZINE

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AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1982; Dealer and Repairman (monthly), October, 1883; founded in 1885, May, 1918.

EDITORIAL EXECUTIVE OFFICES, Chestnut and 56th Sta., Philadelphia 39, Pa., U.S. A. Cable address-Autoland, Philadelphia, Philadelphia, Pa., Philadelphia, Philadelphia,

AUTOMOTIVE INDUSTRIES. Published semi-monthly by Chilton Company, Chestnut & 56th Sts., Phila. 39. Second Class Postage Paid at Philadelphia, Pa.; Under the Act of Congress of March 3, 1879. Subscription price: To manufacturers in and suppliers to the automotive industries in the U. S., U. S. Possessions and Canada, \$2.09 per year; \$3.00 for 2 years. All Others, \$10.00 per year. Single copies, 50c. Statistical Issue, \$1.00.

AUTOMOTIVE INDUSTRIES

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continued

Machining with Coated Abrasive Belts

Abrasive belt machining meets the need for closer tolerances in skin sizing and on brazed honeycomb sandwich in airframes. Page 70.

▼ 34 New Product Items. And Other Features, Such As:

Business pulse, airbriefs, news of machinery industries, trends in construction industry, Washington wire, and industry statistics.

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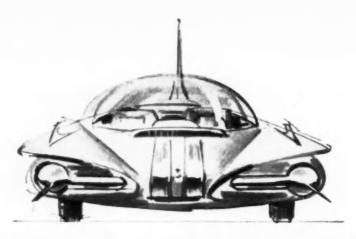
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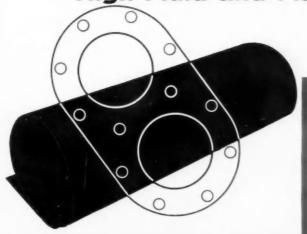
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3 Graphite coated, two sides	*P1161A	12±5	40	1800 psi.	20%
50V	G-1122-1 (AMS 3232F) (Navy Spec. 33-P-13c) *P1141A	12±5	40	2000 psi.	10%
60V	G-1123-1 (AMS 3230 and 3231) *P1151A	12±5	40	2000 psi.	15%
70V	G-1122-1 (AMS 3232F) *P1141A	12±5	40	2000 psi.	10%

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OF COMING SHOWS AND MEETINGS

- International Automotive Service Industries Show, Navy Pier, Chicago, III. Feb. 18-29
- American Petroleum Institute Div. of Marketing, Lubrication Committee Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. . . Feb. 26-27
- World Wide Auto Show, Miami Beach Exhibition Hall, Miami Beach, Fla. Feb. 27-Mar. 8

- Ninth Annual National Autorama, Connecticut State Armory, Hartford, Conn.Mar. 4-8
- Western Space Age Conference and Exhibit, Great Western Exhibit Center, Los Angeles, Calif...Mar. 5-7
- ASME Gas Turbine Conference and Exposition, Netherland Hilton Hotel, Cincinnati, O. Mar. 8-11
- Steel Founders' Society of America, 58th annual meeting, Drake Hotel, Chicago, III.Mar. 9-10

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- ASME Aviation Division Conference, Statler-Hilton Hotel, Los Angeles, Calif. Mar. 9-12
- National Association of Manufacturers Institute on Industrial Relations, Hollywood Beach Hotel, Hollywood, Fla. Mar. 9-13
- Ninth Annual Iron & Steel Conference, sponsored by Pittsburgh Section of Instrument Society of America, Pick-Roosevelt Hotel, Pittsburgh, Pa. Mar. 11-12
- International Geneva Motor Show, Geneva, Switzerland Mar. 12-22
- Eleventh Western Metal Exposition and Congress, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles, Calif. Mar. 16-20



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FLAT - 1/8" plate - Square butt - One pass - 1/6" Root opening - Welding speed 10 IPM.

VERTICAL UP -1/4" plate — Square butt weld — One pass — 3/6" Root opening — Welding speed 3.25 IPM.

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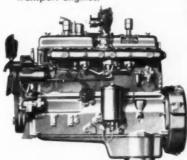
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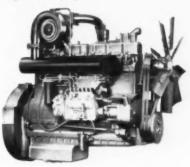


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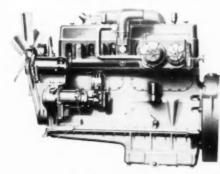
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FRACTIONAL HORSEPOWER
AJUSTO-SPEDE® DRIVES

Parker Majestic No. 2 Universal Grinder is equipped with two Ajusto-Spede Drives. One drive, mounted on the headstock, rotates the work against the grinding wheel. Another drive operates the table feed. Both work speed and table speed are infinitely adjustable to suit varying conditions.

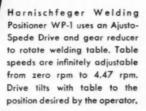
A Dynamatic Ajusto-Spede Drive provides infinitely adjustable table feed speeds on a Gorton Mastermil. Stepless adjustment permits the operator to select the proper table speed for maximum efficiency in machining all metals.

Wherever infinite adjustment and accurate control of speed are required for proper machine operation, satisfied users are realizing improved machine performance and product quality through the use of Dynamatic Ajusto-Spede Drives. Stepless adjustment from zero to full output speed, and accurate control of any speed within the range, permit operation at the exact speeds required.

Ajusto-Spede Drives operate on standard 115/220 volt alternating current, requiring no special power source. The compact drive with its integral control system needs no wall space, and requires little space on the driven machine. These drives may be mounted in any position, providing great versatility of application. Twelve models are available in ratings from ½ hp at 1650 rpm through 1 hp at 3200 rpm.

Before you specify a fractional horsepower drive for your product or plant equipment, check the many advantages offered in the Dynamatic Ajusto-Spede Drive.

Send for Your Free Copy of Illustrated Bulletin FAS-6 which Describes Dynamatic Ajusto-Spede Drives





Vibration Fatigue Testing Machine manufactured by the All American Tool and Mfg. Company employs an Ajusto-Spede Drive to operate a vibrating table at various speeds for testing instruments and electrical components.

EATON

MANUFACTURING COMPANY
3307 FOURTEENTH AVENUE . KENOSHA, WISCONSIN

NATIONAL OIL SEAL LOGBOOK

Ask yourself these questions when specifying oil seals

SHAFT RPM, FPM, RUNOUT, ENDPLAY	Is seal rated at or above my anticipated operating extremes? YES NO
TEMPERATURE, Lubricant Types	Will heat or special-purpose lubricants attack my sealing lip compounds? YES NO
PRESENCE OF DIRT OR OTHER FOREIGN MATERIAL	Point often overlooked. If present, should I specify dual-lip sealing member? YES NO
COST RELATED TO SEAL DESIGN	Will a simpler, less expensive seal do as good a job as a more so- phisticated unit? YES NO
NEW SEAL DESIGNS AND Materials on Market	Are there new high temperature, high speed compounds I should examine before specifying? YES NO
SPECIAL DESIGNS FOR SPECIAL PROBLEMS	Not all sealing jobs can be met with stock seals. Do I need a special factory design? YES NO
DELIVERY, REPUTATION FOR QUALITY	Is my resource noted for on-time delivery, uniform quality, and good follow-up service? YES NO

Don't specify "blind." Your National Oil Seal Engineer has up-to-date data on seals—old, new and under development. He understands current sealing parameters; what special designs can probably be developed. His frank, free counsel can't help but lead to better sealing, faster assembly, simpler servicing, faster delivery or lower cost.



Call him today. Number's in the Yellow Pages, under Oil Seals.

NATIONAL SEAL

Division, Federal-Mogul-Bower Bearings, Inc. General Offices: Redwood City, California Plants: Redwood City and Downey, California Van Wert, Ohio







PRODUCT PROTECTION BY THE GALLON







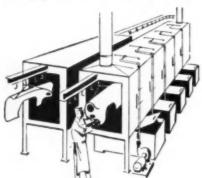


WITH AMCHEM GRANODINE!

One of the most widely used metal finishing chemicals, Amchem Granodine is the most effective pre-paint treatment yet developed for the protection of fabricated steel preducts.

The non-metallic phosphate coating produced by Amchem Granodine provides an effective base for durable paint finishing and greatly improves the corrosion resistance of the finished product. A variety of Granodizing processes are available for a wide range of finishing operations . . . to assure your products of greater usability through lasting protection.

It may be well worth your while to investigate cost saving, efficient Amchem Granodine—today's most modern metal finishing chemical for steel. Check Amchem where service goes beyond the product with a complete program of technical and engineering assistance!



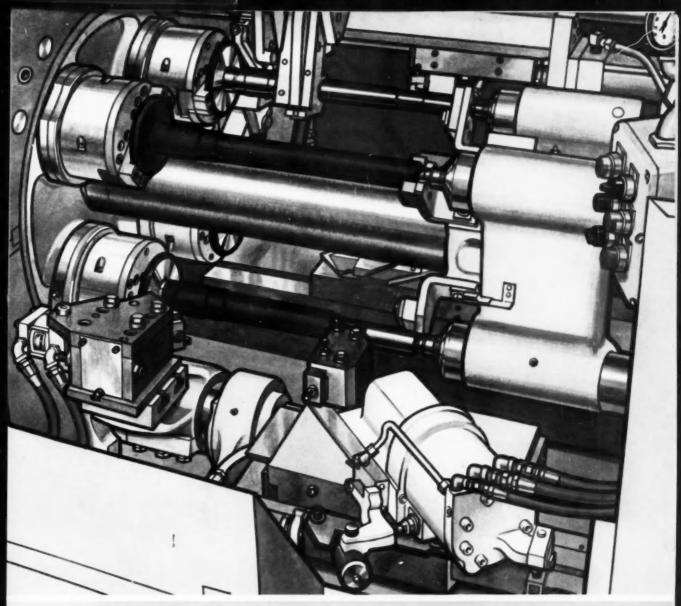
Granodizing process may be applied by power spray (shown on left), dip system or by hand application.

Write for Bulletin 1380 with Selection Chart to help you choose the Granodine type for your specific needs—and bulletins featuring other Amchem chemicals of vital interest to the fabricator of steel products.





Amchem Granodine is another chemical development of Amchem Products, Inc., Ambler, Pa. Formerly American Chemical Paint Company, Detroit, Mich. • St. Joseph, Mo. • Niles, Calif. • Windsor, Ont./Amchem and Granodine are registered trademarks of Amchem Products, Inc.



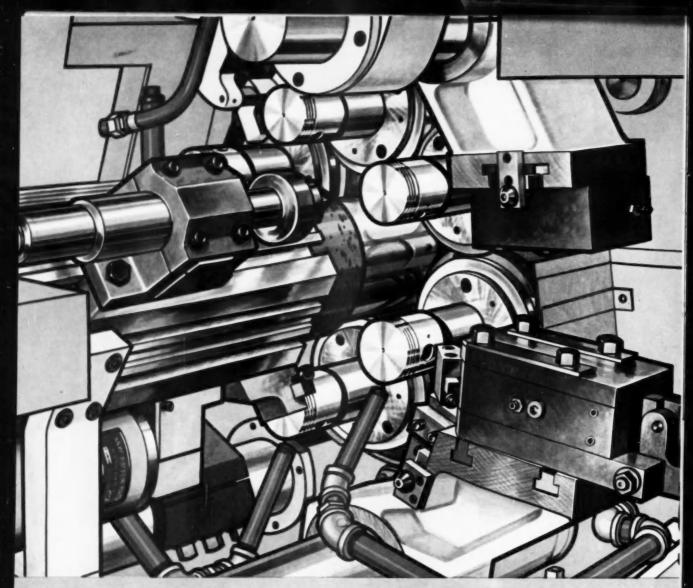
copy more than three times faster on

New Britain 4-spindle copying lathe

For the first time... multiple spindle copy turning. Loading station and three work stations. Work chucked between centers which index together. Template-controlled hydraulic slides perform copy turning; cross slides and/or forming arms perform a wide variety of additional operations. Two-speed spindles, automatic loading and unloading, and automatic chip conveyor optional. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.



Model 412/25 Copying Lathe

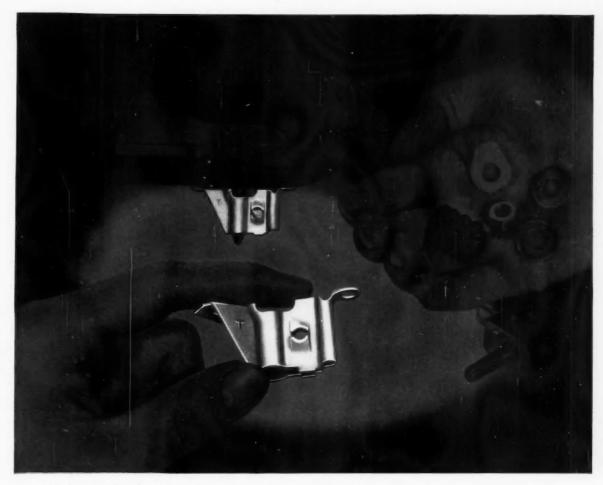


make higher production pay for itself

A New Britain four-, six- or eight-spindle chucker with open-end design, massive forming arms, large capacity (up to 15") will machine your castings and forgings faster at less cost. You can measure it in *income* instead of *cost* because New Britain Chuckers pay as they go. New Britain's new financing plan makes large initial investment unnecessary. New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.



NEW BRITAIN CHUCKING MACHINE



Engineered by Tinnerman ...

3-way savings for Chrysler Corporation when one SPEED NUT® replaced 5 parts

Four parts eliminated...

Parts cost reduced 40%...

Assembly costs cut 12%...

All these savings were accomplished when the Chrysler Corporation switched to a Tinnermanengineered Speed Nut Brand Fastener developed to hold car and truck window vents in place. The all-spring-steel fastener serves as a friction brake to hold the vent at any desired position.

You, too, can achieve savings like these on parts for your assemblies . . . a no-obligation Tinnerman Speed Nut Fastening Analysis will quickly locate the places. Your Tinnerman sales representative will discuss your problem, arrange for the Analysis. He's listed in your Yellow Pages under "Fasteners." Or write to:

TINNERMAN PRODUCTS, INC. Dept. 12 · P.O. Box 6688 · Cleveland 1, Ohio



CANADA: Dominion Fastreers Ltd., Hamilton, Ontario, GREAT ORITAIN: Simmonds Aerocessaries Ltd., Treferest, Wales, FRANCE: Simmonds S. A., 3 ros Salomon de Ruthschild, Suresnes (Seine), GERMANY: Mecane-Bundy GmbH, Heidelberg,

Cape Cod in Death Valley

... thanks to an automotive air conditioning system



And whatever the system: Thermostatic by-pass...pressure actuated by-pass (shown at right) or any other, A-P will supply the thermostatic expansion valves, drier receivers, liquid indicators and distributors in capacities, connections and operating characteristics to match.

Pioneers in this field, A-P stands ready to assist you in all phases of automotive refrigeration control. Standard controls or specially designed units can be produced in any quantity, with every customer, large or small, benefiting from the latest research and engineering techniques employed at A-P.

And more than 400 refrigeration jobbers give you coastto-coast replacement service. Write today for new, comprehensive bulletin.



MODEL 412 DRIER-RECEIVER with sight glass. PA-400 silica gel protects 100% against acids and maisture.



MODEL 237-A PRESSURE ACTU-ATED BY-PASS — Provides by-pass for car temperature control or prevention of evaporator freezeup. Extremely compact. Available with toggle for remote control. Connections: 3½, 1/2 or 3½" male flare inleft, outlet.



MODEL 207-C THERMOSTAT-IC EXPANSION VALVE — Adjustable or fixed super-heat. Pressure limit on special order. Internal or external type equalizer. 1-ton or 1 V₂-ton capacities, R-12.



PRESSURE-TYPE DISTRIBU-TORS — uniform flow to all circuits. Any size and number of outlet openings; also side opening for bypass connection if required.

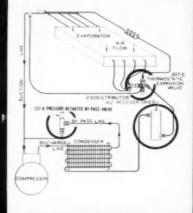


CONTROLS COMPANY OF AMERICA Manufacturers of A-D CONTROLS

2415 NORTH 32ND ST. • MILWAUKEE 10, WISCONSIN COOKSVILLE, Ontario • NIJMEGEN, Holland

Controls That Make Modern Living Possible

Pressure-actuated By-pass system



A-P CONTROLS ARE USED BY THE FOLLOWING:

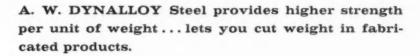
Chrysler Corp.
A. O. Sutton Corp.
American Motors Corp.
Ford Motor Co.
Ford Div.
Ford Mator Co.
Mercury Div.
Ford Motor Co.
Edsel Div.
A.R.A. Mfg. Co.
Capitol Refrig. Co.

Clardy Auto Air
Conditioning Co.
Climatic Air. Mfg. Co.
Forston Mfg. Co.
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MORE STRENGTH

LESS WEIGHT





Specify DYNALLOY and realize these additional advantages: weldability, easy formability and resistance to corrosion and impact. In products where high strength and low weight are desirable, DYNALLOY will provide you with a means to higher quality production . . . lower costs . . . increased profits. Call your Alan Wood Representative today! He's always available and ready to help.

ALAN WOOD STEEL COMPANY

CONSHOHOCKEN · PENNSYLVANIA

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...as EVANS HEATERS

are right for trucks!

Tough jobs call for the right equipment. Heavy snow can't be cleared with a shovel and broom, and a truck can't be adequately heated by a heater built for passenger cars.

Evans heaters are right for trucks because they're built for trucks. They have the same rugged dependability you build into your trucks . . . the same high standards of manufacture that guarantee peak performance and low maintenance costs. The heaters Evans engineers design and custom-build for you will meet all your truck requirements. Our engineers will be glad to call and discuss your heater problems for any truck model, present or future. For information write Evans Products Company, Dept. P-2, Plymouth, Mich.

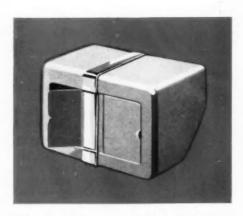
Regional Representatives: Cleveland, Frank A. Chase Chicago, R. A. Lennox • Detroit, Chas. F. Murray Sales Co. Allentown, Pa., P. R. Weidner

EVANS HEATERS ARE RIGHT FOR TRUCKS BECAUSE THEY'RE BUILT FOR TRUCKS

EVANS PRODUCTS COMPANY ALSO PRODUCES:

failroad loading equipment; bicycles and velocipedes; Evaneer fir plywood; fir lumber; Evanite battery separators and Evanite hardboard.





AUTOMOTIVE INDUSTRIES, February 15, 1959



Hydraulic Impulse Machine "road-tested" Morse Timing Chain and other chains at the equivalent of 95 mph. For results, see below.

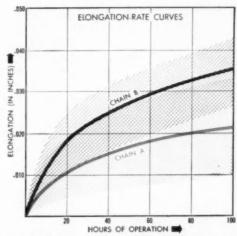
Hundred-hour "stretch test" at 95 mph proves Morse Timing Chain 24% better!

In lab test at 4000 rpm under 90-lb load Morse Timing Chain elongates 24% less than second-best timing chain

The graph at right shows how Morse Timing Chain resists elongation better, even under severest operating conditions. No wonder Morse Timing Chain has been specified for over 80,000,000 car engines.

Today's high-horsepower engines demand split-second timing for top performance. So Morse builds each timing chain like a fine watch; inspects it carefully with modern equipment to insure *extra* thousands of trouble-free miles.

For original equipment or replacement timing chains, it pays to contact Morse first. Get full information and practical engineering help. Call, write or wire today: MORSE CHAIN COMPANY, DETROIT, MICHIGAN; ITHACA, NEW YORK. Export Sales: Borg-Warner International, Chicago 3, Illinois.



Morse 53-121 Timing Chain (A) showed 24% less elongation than other chain (B), after 100 hours at 4000 rpm under a 90-lb. load on the Hydraulic Impulse Machine—a very severe test that has been correlated with road and dynamometer test runs.

SERVING THE AUTOMOTIVE INDUSTRY FOR OVER 55 YEARS



A BORG-WARNER INDUSTRY



Edward Valves Div. cuts setup time on valve bodies

Takes advantage of electric setup control panel, octagonal turret, JETracer on Gisholt Fastermatic

You may spot production ideas in the way Edward Valves Division of Rockwell Manufacturing Company, East Chicago, Indiana, is increasing production of 1½" steel Univalve bodies.

A new Gisholt MASTERLINE 2F Fastermatic Automatic Turret Lathe is doing the job. With the Fastermatic's electric setup control panel, the operator preselects all important machine functions—including low spindle speeds for forming and threading, and high speeds for other operations. And with the Gisholt JETracer slide tool mounted on an 8-sided turret, a maximum number of surfaces are machined in a single chucking—with greater accuracy, finer finish and with more consistent quality.

Parts are held in an 18" 2-jaw hydraulically operated chuck. Automatic positioning at the end of each cycle speeds loading and unloading. Once the automatic cycle starts, turret tools drill, turn, face, form, relieve, chamfer, bore and thread. Cross slide tools face and chamfer. Critical internal diameters are finished to a high degree of accuracy, using turret-mounted JETracer slide tool.

Like to hear the facts on how the Fastermatic lets you utilize smart tooling...eliminate human errors...get record production on long runs, automatic cycle operating advantages on short runs? Contact your Gisholt Representative. He has the facts, and his wide experience may suggest new methods to improve your profit picture.



G SMACHINE COMPANY

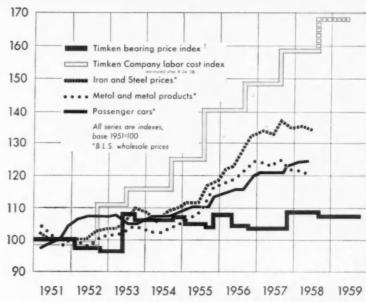
Madison 10, Wisconsin, U.S.A.

write GISHOLT TODAY for advance data on the new Gisholt MASTERLINE Fastermatic Automatic Turret Lathe. Ask for Bulletin No. 1179.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY REBUILT MACHINES WITH NEW MACHINE GUARANTEE

YOU CAN KEEP BEATING INFLATION IN BEARING COSTS

THIS CHART shows what's happened to the price of Timken® bearings for automobiles compared to other things automakers buy, since our new-design bearings came along. Almost nothing! You helped keep the cost down by standardizing on these new-design Timken tapered roller bearings made by ultra-modern methods. Now, here's how to keep that price way down (see below).



COMPUTED FROM TOTAL VEHICLE COST OF PINION, DIFFERENTIAL, REAR AND FRONT WHEEL BEARINGS.

WITH MORE STANDARDIZATION ON BEARING SIZES

THIS PICTURE shows just a few of the custom-made machines in our revolutionary Bucyrus, Ohio, plant that has industry buzzing. By standardizing even more on a few Timken bearing sizes (especially in pinion and differential), you enable these missile age machines to run nonstop at full-tilt production. Result: We'll keep production costs down and continue to pass the savings on to you. Do more standardizing. Use more Timken bearings made by cost-cutting techniques. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable: "TIMROSCO".



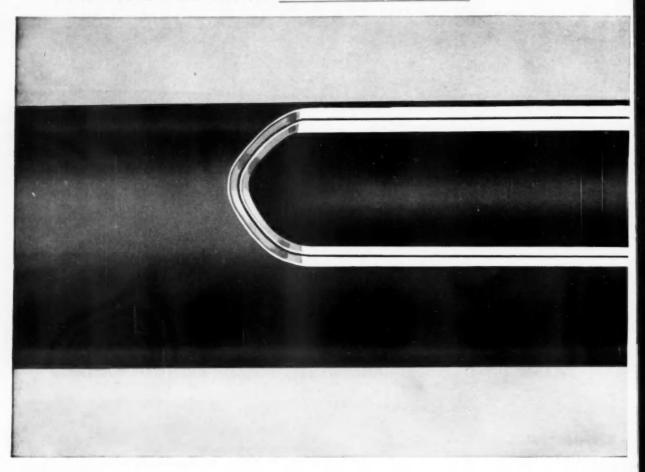


TIMKEN

TAPERED ROLLER BEARINGS

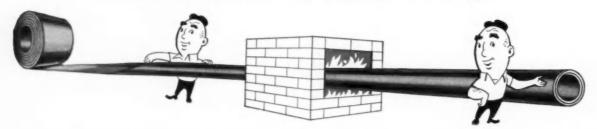
First in bearing value for 60 years

WHY BUNDY LEADS IN MASS-FABRICATION:



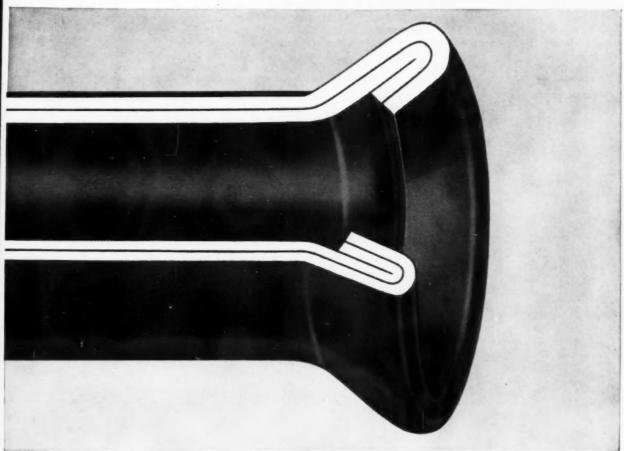
DOUBLE FLARE...Another reason why Bundyweld

And Bundyweld can be mass-fabricated to any specifications you give—at a low cost made possible by three Bundy advantages:



Bundyweld starts as a single strip of copper-coated steel. Then it's continuously rolled twice around laterally ...

into a tube of uniform thickness, and passed through a furnace where copper coating fuses with basic steel. Result: Bundyweld Tubing—doublewalled, beadless, metallurgically bonded through 360° of wall contact.



Cutaway of Bundy double flare (greatly magnified) that puts almost twice the metal at the seat.

insures extra brakeline safety

This is the famous Bundy® double-flare—developed to take high wrench-torque and frequent uncouplings . . . and still carry high-pressure hydraulics with perfect safety. It's just one example of how Bundy leads in mass-fabrication these three ways:

1. The tubing itself—Bundyweld, double-walled from a single steel strip. It stands up against brutal shocks and vibration fatigue. That's why it's on 95% of today's cars, in an average of 20 uses each.

2. Bundy design service—Skilled engineers are on call at any stage in the development of your product. Often they'll suggest short-cuts to trim costs.

3. Bundy fabrication service—Trained technicians man Bundy-designed machines . . . turn out parts to your specifications at lowest unit cost.

Add if up—then check first with Bundy for the finest in small-diameter tubing plus unmatched design and fabrication service. Contact us today!

BUNDY TUBING COMPANY . DETROIT 14, MICHIGAN

WORLD'S LARGEST PRODUCER OF SMALL-DIAMETER TUBING . AFFILIATED PLANTS IN AUSTRALIA, BRAZIL, ENGLAND, FRANCE, GERMANY, AND ITALY

There's no real substitute for

BUNDYWELD TUBING

Bundyweld and Bundy specialty tubings are sold through distributors in principal cities

Circle 129 on Inquiry Card, for more Data

Circle 130 on Inquiry Card, for more Data

So what's new about a flush pushbutton? This! . . . new Westinghouse flush pushbuttons are the thinnest overall! The new button is thin . . . the new contact blocks are shallow . . . the entire flush pushbutton is the thinnest from front to back! What's more, you can stack these new, shallow blocks for control of multiple operations. And this! . . . only Westinghouse flush

pushbuttons have a variety of color-coded snap-on caps that let you change the color of the button without changing the button! New Westinghouse flush pushbuttons are oiltite, of course . . . they were designed

by Westinghouse, with the cooperation of representatives of the machine tool industry, to meet the most exacting requirements of machine tool and control panel applications.

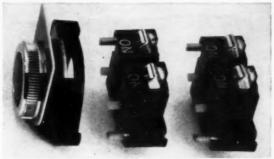
And, they're available now from the manufacturer of the world's most complete line of pushbuttons. To order, simply contact your nearby Westinghouse sales office or distributor, or write: Westinghouse Electric Corp., Standard Control Division, Beaver, Pennsylvania.



Change the color without changing the button! Color-coded snap-on caps come in red, black, blue, green, gray, yellow, brown.

YOU CAN BE SURE ... IF IT'S Westinghouse

NNOUNCING the newest addition to



New shallow contact blocks can be easily stacked to give you multiple control circuits. Terminals are angled...easy to get at with a screwdriver, even when blocks are stacked.

industry's most complete line of pushbuttons

FLUSH-PUSH-BUTTONS

KING-SEELEY INSTRUMENTATION

The Quality Standard For 1959

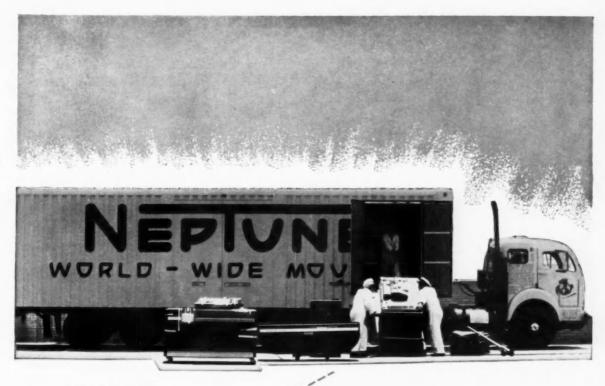


KING-SEELEY CORPORATION

ANN ARBOR, MICHIGAN

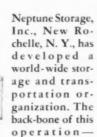


8242



Geared by FULLER...

NEPTUNE WORLD-WIDE MOVING solves road maintenance expense problem with ROADRANGER® Transmissions



which reaches all the way from New York to the Far East—is unscheduled, irregular-route hauling. Drive line failures, however, were causing excessive downtime and parts costs, were creating difficulty in controlling expenses, and were causing hardships to customers. In 1956, Neptune began an organized investigation in an attempt to reduce road maintenance. One of the steps taken was purchase of 15 tractors equipped with single-stick Fuller R-46 8-speed ROADRANGER semi-automatic Transmissions.

After 100,000 miles of operation,

performance and maintenance records were reviewed. The results were so satisfactory that Neptune bought 46 more ROADRANGER-equipped units. As Neptune Fleet Superintendent Robert Kirschenbaum says, "We have been extremely pleased with the performance of our ROADRANGER-equipped fleet ever since."

Find out why Neptune—like dozens of other fleets — has turned to Fuller. Ask about the ROADRANGER Transmission tailored for your needs.



FULLER

MANUFACTURING COMPANY

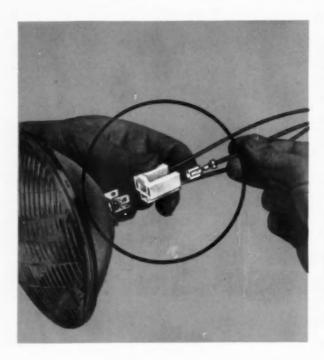
KALAMAZOO, MICHIGAN

Subsidiary EATON Manufacturing Company

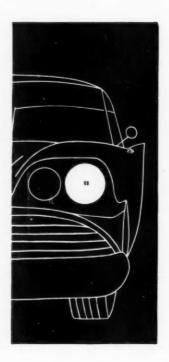
Unit Drop Forge Div., Milwaukee 1, Wis. * Shuler Azle Co., Louisville, Ky. (Subsidiary) * Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulse 3, Okla.

Automotive Products Company, Ltd., Brack House, Langham Street, London W.1, England, European Representative

IT'S A SNAP







THE CANCEL FASTIN-FASTON SAVES TIME AND MONEY ON YOUR SEALED BEAM HEAD LAMP CONNECTIONS

The new A-MP FASTIN-FASTON snaps onto sealed beam head lamps with a thrust of the fingers. For two or three tabs. The FASTIN-FASTON obsoletes all other connectors, ends inspection rejects, saves on installation time and costs while assuring uniform quality.

FASTIN-FASTON housing made of Cycolac for excellent dielectric characteristics. Tab receptacles self-lock in housing . . . offer highest electrical values and rugged, vibration resistance. Compression crimp for maximum conductivity.

No auxiliary parts or accessories.

Unvarying performance and lower cost . . . a snap for the all new A-MP FASTIN-FASTON.

For more information, write today.

ENERAL OFFICES: HARRISBURG,

A-MP products and engineering assistance are available through subsidiaries in: Canada . England . France . Holland . Japan

NEW FROM HONEYWELL!

THE "COMPLETE SAFETY" PROTECTOGLO*

COMPLETELY FAIL-SAFE

Listed and approved by the Associated Factory Mutual Laboratories and by Underwriters' Laboratories.

The need for protection in gas burner operation has been long recognized . . . and the subject of intensive research.

In 1951, a Honeywell advancement provided a "self-checking" operation at the time of burner startup...and spurred the search for full-time protection, because flame-safeguard components can and do fail "unsafely."

Now Honeywell, first again, offers a self-

checking circuit that continuously supervises all system components. Never before has there been such complete protection . . . protection you can't afford to be without. Write for Specification S1015-5.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell



First in Control

*"A significant technical advancement" . . . at the A.G.A. Convention, Parade of Gas Progress.

Automotive Industries, February 15, 1959

Circle 134 on Inquiry Card, for more Data

NEW LEADED STEELS FROM RYERSON

Now, machine parts faster than ever before

NEW LEDLOY 170 TUBING

average machining speed 170 surface feet per minute

Here's the fastest-machining steel tubing ever produced -and only Ryerson has it available for immediate shipment from stock. Ledloy® 170 is a cold drawn, seamless product of low carbon analysis with .15% to .35% lead added. It promises a minimum increase of 25% in productivity of machined parts or components. Sizes range from 1" to 21/2" O.D. with maximum 3/8" wall thickness. Other sizes can be supplied promptly.



MACHINING COMPARISON*

Ledloy 170 Tubing vs. Nonleaded Tubing

	Ledioy	170	MT-1015			
	Speeds	Feeds	Speeds	Feeds		
Center drill	172 s.f.m.	.005"	110 s.f.m.	.005"		
Form tool	172 s.f.m.	.0008"	110 s.f.m.	.0008*		
Boring tool	172 s.f.m.	.007"	110 s.f.m.	.007"		
Cutoff	172 s.f.m.	.0013"	110 s.f.m.	.0013"		
Thread	27 s.f.m.	-	20 s.f.m.	-		
Тар	18 s.f.m.	-	12 s.f.m.	-		
Production time	35 seconds		49 seconds			

NEW LEDLOY 375 BARS

average machining speed 375 surface feet per minute

This newest addition to Ryerson free-machining screw steel stocks is the world's fastest-machining steel. Assigning the figure 100 to B-1112 and using this as a base, Ledloy 375 has a machinability index of 205 plus. It rates about 64% higher than B-1113 and about 20% higher than Ledloy 300.

Ledloy 375 bars presently in Ryerson stocks include rounds in sizes from 1/4" to 1", hexagons 1/4" to 5/8".

Ask your Ryerson representative for complete details on these new steels. And call Ryerson for an unequaled selection of cold finished bars and tubing, including the largest stocks of Ledloy 300 (also known as Ledloy A) and Rycut® leaded alloys-the fastest machining in their carbon ranges.

I.V.B.M

Increased Value in Buying Metals Ask about this Ryerson Plan for 1959



RYERSON STEEL

Principal Products: Carbon, alloy and stainless steel - bars, structurals, plates, sheets, tubing - aluminum, industrial plastics, metalworking machinery, etc.

PLANTS AT: NEW YORK - BOSTON - WALLINGFORD - PHILADELPHIA - CHARLOTTE - CINCINNATI - CLEVELAND - DETROIT - PITTSBURGH BUFFALO - INDIANAPOLIS - CHICAGO - MILWAUKEE - ST. LOUIS - DALLAS - HOUSTON - LOS ANGELES - SAN FRANCISCO - SPOKANE - SEATTLE

News

OF THE AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 120, No. 4

February 15, 1959

Car Production in January Up 12 Per Cent Over 1958

Passenger car production in January rose nearly 12 per cent over a year ago, despite a severe cutback at strike-hampered Chrysler Corp.

All car companies except Chrysler raised their output as the industry built 545,757 cars and 99,054 trucks, buses and commercial vehicles. A year ago production totaled 489,358 cars and 82,645 commercial units.

Chrysler's output, curtailed by a glass supplier's strike, fell to almost nothing during the final two weeks of the month. In the week ended Jan. 31 Plymouth built only 130 cars and Dodge only 48.

But schedules during the first half of the month were higher than a year ago, so the month's total of 51,461 cars was only 8500 below last year.

Small Car Output Jumps

American Motors and Studebaker-Packard, the industry's only small car builders (at the moment), both jumped production by big percentages. AMC doubled its output of Ramblers from 16,311 to 34,316, a new monthly record. The final week of the month saw another production mark set with 8484 units built.

S-P did even better. Production leaped from a total of 2,627 Packard

leaped from a total of 2,627 Packard and Studebaker cars in January, 1958, to 15,526 Larks last month. And as the month ended, the company rounded out the addition of 700 men to its work force to boost production to 84 cars an hour during February.

The Lark claimed two per cent of total sales during the first 50 days on the market, according to S-P's vp and general sales manager S. A. Skillman. This compares with less than one per cent penetration during the previous 10 months.

Chevrolet Ahead

At Ford and GM the increases were less spectacular. Ford increased its



NEW WOLSELEY IS LOWER, LONGER AND WIDER

Walseley 15/60 is newest of a run of Anglo-Italian cars. It is designed by Pinin Farina, who is restyling progressively the entire range of British Motor Corp. models. The 15/60 is lower, longer and wider than the 15/50 model it replaces. It retains most of the major components, however, including the 90.8-cu in. engine. A 19-cu ft trunk is accommodated in the substantial rear overhang.

total production from 135,626 cars a year ago to 160,824, while GM jumped output from 274,866 to 283,630 units.

Buick, which reduced production in the third week of January, was the only division at either company to show a decrease, dropping from 36,463 to 35,316.

Chevrolet, with 152,163 cars for the month, led Ford by a margin of nearly 18,000 cars. But Ford showed a better percentage increase over a year ago, and the division slated another production boost for February.

Chevrolet's 1959 production topped its year-ago figure by only 345 cars. Ford on the other hand, topped its 1958 total by 15,769. February output was slated to be 13 per cent higher than January and 31 per cent above a year ago.

Ford claimed a 40 per cent jump in sales during the first 20 days of January.

Chrysler, incidentally, sued to recover its glass-building tools and fixtures from three strike-bound plants of Pittsburgh Plate Glass Co. Although there was no confirmation, it was believed Ford Motor Co. would make some of the Chrysler glass until settlement at Pittsburgh. Ford began earlier to supply American Motors with its glass needs.

Studebaker-Packard Reports Profit for Last Quarter

Studebaker-Packard, after a fiveyear famine, reported a profit of \$3.7 million on sales of \$88.6 million for the last quarter of 1958.

The black ink figure, plus an adjustment of approximately \$5 million, will cut the 12-month loss from the \$22.5 million reported at the three-quarter mark to some \$13.8 million for the year.

H. E. Churchill, S-P president, said the profit is the result of the success of the Lark, the company's new small car, which has been selling well ahead of last year's offerings.

The fourth quarter sales and earning figures compare with sales of \$65.7 million and net loss of \$1.5 million a year ago.

NEWS AND AVIATION



NEW A55 CAMBRIDGE RESTYLED BY FARINA

Austin Motor Co. introduced the new A55 Cambridge, which combines the classic styling of Pinin Farina and British Motor Corp. engineering. New model features increased passenger and trunk space, wraparound windshield, and higher horsepower. Car is powered by an improved B.M.C. B-type engine that develops 53 bhp at 4350 rpm and has an 8.3 to 1 compression ratio.

GM Ready To Build Turbine; Chrysler Claims Two Gains

Allison Div. of General Motors announced it is making available a 225 hp gas turbine engine for military and commercial applications. Prototypes already have been ordered for delivery this year to several major equipment builders.

Meanwhile, Chrysler Corp. announced that it has scored two major gains in development of a gas turbine engine for passenger cars. One is an advance in engine design, with improved fuel economy; the other in metallurgical research, with two promising new high temperature materials.

Allison Test Program

Allison has taken over the GM gas turbine development project which originated at the Tech Center's Research Laboratories and eventually included the Firebird II and Firebird III experimental cars. Part of Allison's own engineering test program includes evaluation in a Cadillac-built M-56 tank and Chevrolet truck.

E. B. Newill, vice-president of GM and general manager of the division, said the GMT-305 Whirlfire regenerative turbine engine is "fully competitive with the best gasoline engines on the market today," and soon will be

competitive with the best Diesel en-

The GMT-305 can be installed in heavy-duty on-highway and off-highway vehicles, prime movers, military and marine applications and stationary power plants. Newill says the engine can operate on kerosene, leaded or unleaded gasoline, diesel or jet aircraft fuels. It can be adapted to operate on fuels such as propane or natural gas.

The 305 weighs 650 lb and is 30 in. wide, 25 in. high, and 37 in. long. Rotating regenerators, claimed to be 90 per cent effective in recovering exhaust heat and subdue exhaust noise, eliminate the need for a muffler. No coolant radiator, fins, fans or plumbing are required.

Chrysler Turbine

While GM is concentrating on development of a big commercial, or heavy-duty, turbine, Chrysler is stressing a turbine for passenger cars.

George J. Huebner, Jr., executive engineer in charge of research at Chrysler, said there are still two big questions that remain to be answered before the gas turbine can be considered as "economically desirable in volume-produced passenger cars and commercial vehicles."

Chrysler recently completed a 576-

mile cross-country economy run with a turbine-powered 1959 Plymouth. Huebner disclosed an average of 19.39 mpg of Diesel fuel at an average highway speed of 38.3 mph. This latest turbine version, he said, showed an improvement of nearly 6 mpg over the engine tested two years ago.

On the 618-mile return trip (from Hightstown, N. J., to Chrysler's home engineering laboratories), speed averaged 51.65 mph and fuel consumption averaged 17.17 mpg. On the return trip over the turnpike, the test car used Diesel fuel, turbo-jet fuel, clear and leaded gasoline.

Huebner said the gain in fuel economy made since the 1956 economy run is due directly to work in three important engine areas — compressor, burner and regenerator. He said his engineers boosted the compressor efficiency up to 80 per cent without increasing compressor size.

The regenerator now can reclaim about 90 per cent of the heat energy in exhaust gas. This is an improvement of four points. And burner efficiency has been improved, he added, so that the point of complete combustion is at hand.

New Metals

Huebner described work on two materials for use in critical components, without the necessity of critical or strategic alloying agents, such as cobalt. One new (unnamed) material can be rolled, cast, forged, and formed at normal steel working temperatures. It has excellent resistance to oxidation at temperatures above 2000 F for continuous operation, and even higher temperatures for short periods. Combustion chamber liners, hot gas passages and other non-moving parts are some of the possible applications.

The other material, Huebner said, could be used in turbine wheels and buckets. It has the strength, dimensional stability and heat resistant qualities of the superalloys used in military turbo-jet engines. Also, it is as easy to weld, yet is less brittle.

Huebner pointed out that Chrysler's passenger car approach to turbine research is the best way to minimize variables and make valid comparisons with a piston engine.

New 10-Speed Transmission Introduced by Ford Tractor

A new 10-speed selective power shift transmission has been introduced by Tractor and Implement Div. of Ford Motor Co. as the highlight of Ford's 1959 farm equipment line.

The 10-speed transmission, called



CZECH TRUCK

Newest Czech truck the five-ton Praha S5T is powered by a 452cu in air-cooled sixcylinder Diesel. gine develops 98 bhp at 2100 rpm and drives through a fourspeed gearbox. Twospeed transfer case provides total of eight forward ratios. It is electro - pneumatically operated by pushbuttons on the main shift lever, as is the differential lock.

J. L. Gilmour, assistant chief engineer in charge of special projects at Chrysler's Engineering Div., says graphic illustrations save time, improve quality, and are easier to understand.

Gilmour says a complete book of graphics with all the engineering data on a car can be carried under the arm. The same amount of information, in the form of conventional drawings, would require a "fair sized" truck, he says.

Graphics, including special bar graphs and three-dimensional illustrations, are particularly helpful in planning product detail, timing considerations and early program planning, according to Gilmour.

"Select-O-Speed," is controlled by one small hand lever below the steering wheel. Changes in gear ratio are made with the tractor in motion, with virtually no hesitation, according to Ford.

Forward speeds range from .6 mph at 1200 rpm to over 18 mph. Two reverse speeds are 1.8 and 5 mph. In addition there are "neutral" and "park" positions.

A separate handle near the selector lever controls power take off, which is completely independent.

Ford's new implement line, introduced over a nationwide closed circuit TV program, also included a multipurpose offset tractor and a lowpriced Diesel tractor powered by a 144-cu in. engine with 16.8 compression ratio.

In the offset tractor the engine and drive train are to the left of the driver, giving unobstructed view for cultivating row crops.

Other new equipment includes a self-propelled combine, a low-cost pickup baler for small farms, a two-row corn picker-sheller, a new type hay conditioner, and a new backhoe in three sizes.

Ford also demonstrated an automatic steering device that guides a tractor with antennae. The wire "feeler," connected with the tractor's steering mechanism, straddles the crop row. Deviation from the crop row activates the steering linkage through the antennae so that the tractor follows the row.

Chrysler Man Urges Broader Education for Engineers

Engineers deserve a broader liberal education, with the "hardware, plumbing, and wiring" reduced or eliminated, according to Chrysler vice-president James C. Zeder.

Specialized training for the student engineer should come from the graduate school or from the company or government agency that hires him, according to Zeder, who is president of the Chrysler Institute of Engineering.

Zeder says the four-year undergraduate curriculum should not waste time by teaching specialized techniques that are certain to become obsolete.

Illustrations May Replace Blueprints in Manufacturing

Blueprints and drawings may be on their way out in many phases of engineering and manufacturing, according to a Chrysler engineer.

German Car Industry Held Lead In Automobile Exports in 1958

The German automobile industry held its lead as the biggest exporter and second largest builder of cars in 1958, according to a report by the Association of German Automobile Manufacturers.

Car production rose 23.3 per cent to 1,495,000 units, the report said, of which 49 per cent, or 733,000, were exports.

Automobile registrations in Germany increased by some 500,000 domestic cars and 100,000 imported makes in 1958, the report noted.



MORETTI CAR HAS CUSTOM-BUILT BODY

Moretti cars, built in Italy by the Moretti Motor Car Factory, will be distributed nationally in the U. S. for the first time by JFR Co., Attleboro, Mass. Ninety per cent of Moretti body components are hand-made, hand-finished, and hand-assembled. Five models are offered: the Coupe, the Super Panoramica Sedan, Grand Turismo Sport Coupe, a four-door station wagon, and the two-passenger Spyder Convertible (shown here). Cars are powered by a four-cylinder engine that develops 35 bhp at 4800 rpm, except for the Spyder engine, which develops 43 bhp at 4800 rpm.

NEWS AND AVIATION



3-WHEEL VAN

Lambretta three-wheel delivery van has enclosed cab seating three people. Total load capacity is 770 lb. Van is powered by 9-cu in. 6-hp engine, driving through a foot-controlled gearbox. A pick-up truck with hinged tailboard is also produced on same chassis.

Chevrolet Will Epand Norwood Assembly Plant

Chevrolet will break ground next month for a new building at its Norwood, O., car and truck assembly plant. The expansion, slated for completion by Sept. 1, will increase floor space by 10 per cent (about 600,000 sq ft).

Norwood has been mentioned as one of the possible assembly sites for GM's forthcoming small car, along with Kansas City and Van Nuys, Calif. One certain assembly plant is the former Willow Run truck plant outside Detroit.

The Norwood plant currently employs nearly 4000 persons, or some 1200 more than when 1959 model production began last Sept. 15. During 1958 the plant produced 117,867 automobiles and 19,476 trucks.

A 204,000 sq ft addition to the adjacent Fisher Body plant was completed during the past year, increasing that plant's production capacity substantially.

Chevrolet produced its 40 millionth vehicle at the Norwood plant on Jan. 28. The plant has built a total of 3,360,000 units since it began operations in 1923.

Ford's Fourth Quarter Gains Put Company in Black for 1958

Ford's fast finish in 1958, with a profit of \$111.9 million during the final quarter, put the company in the black for the 12-month period.

Through the first nine months Ford was carrying an operating loss of \$16.2 million, but the good showing

in the final period changed the color of the ink from red to black.

Ford's 1958 figures show sales of \$4,130.3 million and net income of \$95.7 million. A year ago sales were \$5,771.3 million and income was \$282.8 million.

For the fourth quarter, the \$111.9 million profit came on sales of \$1,-447.4 million. These earnings figures are the highest for any fourth quarter in Ford history except for 1955.

Sales total for the year was 28 per cent below 1957. Factory sales of 1,466,802 units were 34 per cent below 1957. Car sales penetration dropped from 30.8 per cent in 1957 to 28.7 per cent.

The company's sales pickup during the fourth quarter is expected to carry over into 1959, with sales running above 1958.

John S. Bugas, vice president-industrial relations, reported that average gross hourly and weekly pay for Ford workers hit an all-time high during 1958. Total employment and payroll, however, fell off with production drop.

The average gross hourly wage was \$2.739, compared with the 1957 record of \$2.593. Weekly earnings averaged \$108.88, compared with \$106.09 in 1957 and the overtime-packed record of \$106.68 in 1955.

Willys Jeep Sales Up 11 Per Cent in 1958

Willys Jeep retail sales last December ran 75 per cent above the previous December and helped the company record an 11 per cent increase in retail deliveries for the full year. Final quarter sales were up 40 per cent.

Factory sales to dealers were up 17 per cent for the year and 49 per cent for the final three months, a new high.

Chrysler Is Importing Three New Simca Passenger Cars

Chrysler is bringing in three new models of the French Simca passenger car for sale in this country through the corporation's Simca dealer group.

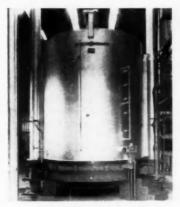
The new models, all on 106-in. wheelbase, are the Vedette Beaulieu V-8, the Ariane V-8 and the Arine four-cylinder model. The Simca Aquilon V-8, offered on both Vedette and Ariane, develops 84 hp. The Whispering Flash ohv four-cylinder engine is rated at 48 hp.

All three body styles are four-door sedans. Styling includes wraparound windshield and curved back light.

Suggested retail prices at East and Gulf Coast ports of entry are \$2298 for the Vedette, \$1998 for the fourcylinder Ariane, and \$2098 for the V-8 Ariane. The Simca import line



Simca Vedette is powered by V-8 84-hp engine



BELL-TYPE FURNACE

General Electric bell-type furnace at the company's Jet Engine Dept. in Evandale, O., hardens and tempers cylindrical jet engine components four ft in diameter and four ft high. Furnace heat treats chromalloy jet engine parts at 2000 F. Load is quenched with liquid CO, which is exhausted by two stacks located on either side at the furnace. Flowmeters (right background) give operator view at type and rate of gas flows at all times.

now includes eight models, ranging from the deluxe five-passenger sedan (\$1698) to the Oceane convertible (\$3167.)

Chrysler now is selling the Simca line through 550 dealers in this country, hopes to add 150 more dealers within a few weeks. All are regular Chrysler Corp. dealers handling domestic cars as well.

Buick Notes Marked IncreaseIn Optional Equipment Orders

Buick reports a rise in optional equipment orders on its 1959 cars, particularly in the less expensive LeSabre series.

Orders for power steering, power brakes, foamtex cushions, windshield washers and backup lights have increased 12 to 20 per cent over the least expensive 1958 models. Automatic transmissions, standard on the Invicta and Electra series, top the list of 32 LeSabre options with 98.2 per cent of total sales.

Car Makers Pay Taxes Early To Ease Michigan's Crisis

General Motors and Chrysler are paying taxes ahead of time to help the state of Michigan out of its pressing financial crisis. GM has agreed to pay \$13 million and Chrysler says it will pay \$2.2 million to be applied against future taxes. McLouth Steel joined the auto firms and other Michigan companies in the prepayment plan.



A new tool detector developed by Cross Co. does away with separate probe and inspection heads and stations and shuts down the machine as soon as a tool failure occurs. The device, called Protect-O-Tool, is mounted on bushing plates behind the regular drill bushing hole. Sensing occurs when the deill or tap passes through the detector before and after machining.

Ford Motor Co. engineers have developed a stainless steel head gasket for several Ford truck engines from Type 430 stainless, a McLouth Steel Corp. product. The head gaskets proved their worth in in an engine operating at full throttle for 1500 hours, simulating 100,000 miles of steady driving under maximum vehicle load and road conditions.

B. F. Goodrich engineers have made a progress report on a synthetic rubber known chemically as brominated butyl which can be used to improve natural rubber so that it holds air as well as the best synthetic product and also to fortify natural rubber against ozone damage.

Standard Pressed Steel Co. is producing standard structural fasteners for use in both airframe and engine bolt configurations at temperatures up to 1600 F. Fasteners are rated at minimum tensile strength of 85,000 psi and minimum stress rupture life of 100 hours at 1600 F.

Automotive finishes made with a new alkyd resin will retain their original color and gloss for years, says Archer-Daniels-Midland Co. Based on a recommonded enamel formula with a 30 per cent melamine level, the new resin (Aroplaz 2580-X-60) shows a Sward hardness of 50 when baked 40 minutes at 300 F.

Shell Chemical Corp. has come up with a new liquid epoxy resin (Epon X-81) for use in adhesive application where temperature changes tend to weaken bonds, and in making tooling dies and fixtures. In standard stretch tests at room temperature, an Epon X-81 casting doubled its length before it broke, Shell says.

Gulf Oil Corp. scientists have devised a practical method for breaking down lubricating oils and studying their molecular make-up. First step was to tear the molecules apart by subjecting them to collisions with electrons in a mass spectrometer and then correlating the number of fragments and sizes of the lube oil from which they came. A further study of the fragments also yielded data on the manner in which atoms were linked up in the molecules. The basic break-through consists of applying mass spectrometer techniques to this purpose and in making sense from the resulting data, Gulf says.

A significant improvement in testing the resilience of foam materials is claimed by Union Carbide Plastics Co., scientists. Briefly, a rebound pendulum test is integrated with a precision potentiometer so that angular positioning curves can be plotted on a recorder.

A new abrasives process known as Magnecoating has been developed by Abrasives Co. of America. The process uses magnetic force to coat flexible backing materials with abrasive particles. These advantages are claimed: dense and efficient coating of the entire disc surface, and removal of excess loose particles from the coated disc by magnetic force.

General Electric scientists have produced electricity directly from the radiation of a radioisotope using a thermionic converter in much the same way as the recently announced AEC atomic generator produces it using a thermoelectric energy conversion device. The GE generator used gold as the radioactive source material.

Canton Malleable Iron Co. is using coining to produce inside diameter bead rings for air springs. The inside diameter on the ring is held within tolerances of plus or minus 0.10 in. and the distance from the mounting face to the underside of the bead within plus or minus 0.0075 in. around the entire length of the bead. Rings are sand cast of malleable iron in four to six sections per ring.

NEWS AUTOMOTIVE



PLASTIC CLUTCH

A new clutch cone for automatic transmissions is now being built of a glass-reinforced phenolic plastic - Durez 16771 - by Smith - Way Plastics Co., New Hudson, Mich. Operator is shown removing molded cone from 60-ton Baker Brothers machine. Pre-form of the plastic can be seen in front of operator, with molded cones in foreground.

CONE

cent foresaw a reversal. Reasons given included growth of suburbs, more teenage drivers, general prosperity, and more families with two or more breadwinners.

Ford Predicts Big Increase In Truck Sales During 1959

Ford Div. looks for a big rise in truck sales during 1959, starting with a 33 per cent jump in first-quarter sales of tilt-cab trucks and a 23 per cent increase in heavy duty truck production.

Ford's prediction is based on December and January truck sales. December sales of 21.385 trucks were the highest for any December since

uary totaled 5724 trucks, or 24 per cent above the like period a year ago. In the second 10 days, sales rose to 6483 trucks, well above the 1958 total of 4537 for the period.

GM Develops New Ultrasonic Gage to Measure Thickness

automobile companies. Auto makers

would be less likely to integrate parts

making operations if the compensa-

by key departments in the Dodge

main plant, which eventually tied up

all Chrysler passenger car produc-

A good example is a recent strike

tion ruling holds.

GM's Process Development Staff has designed an ultrasonic gage that simplifies measuring variations in thickness of material where only one surface is accessible.

The tester was designed primarily for calibrating variations in cylinder wall thickness. But it can be adapted for checking straight or curved surfaces of cast iron, steel, aluminum, magnesium, brass, lead, glass and most solid plastics.

GM says its new tester with its 14. in. oscilloscope, calibrated to .001 in, is easier to read than other ultrasonic devices. A red signal light flashes on when the wall is judged substandard by the gage.

The gage checks thickness by seek-

Growth of Two-Car Trend Forecast by Credit Firm

ing the point where the wall and the vibrating crystal of the gage are in

The trend toward two- and threecar families will become even stronger during 1959, adding extra impetus to automobile sales, according to Universal C.I.T. Credit Corp.

In four years the number of multiple-car households jumped from 4.1 million to 6.45 million last year, according to the credit firm, and should go high during 1959.

Universal C.I.T. surveyed 600 of its dealers attending the National Automobile Dealers Association meeting in Chicago, and 75 per cent forecast an increasing trend. Only two per

Sales in the first 10 days of Jan-

Youngstown Reports Drop In Net Income for 1958

Youngstown Sheet and Tube Co. reported that 1958 earnings dropped sharply to \$21,501,320 from last vear's total of \$42,508,579.

Sales and other income in 1958 amounted to \$506,959,574 compared with \$688,611,592 the previous year. Steel shipments were off from 3,593,-375 tons in 1957 to 2,542,714. Ingot production also fell from 5,137,834 tons in 1957 to 3,659,482 tons last vear.

In commenting on the decline in net income, J. L. Mauthe, chairman, pointed out that though earnings were about half those of 1957, ingot operating rate was 56.3 per cent compared with 82.3 for the preceding year.

Ford Motor Asks New Hearing On Strike Compensation Case

Ford Motor Co. has asked the Michigan Supreme Court for a new hearing in the controversial case involving unemployment compensation for workers laid off because of a strike in another plant.

The Court ruled Jan. 12 that some 11,000 Michigan Ford employes were eligible for compensation when a 1953 strike at the company's Canton, O., forge plant forced certain Michigan Ford plants to close.

Ford's basis for requesting a rehearing is that the ruling violates both state and Federal constitutions.

The real issue at stake is not the compensation payment to the 11,000 Michigan employes laid off in '53. Ford contends, and others agree, that the ruling will give the UAW a powerful wedge to use in collective bargain-

A strike at one plant within a company would force payment of compensation to other laid off workers, who may not be on strike. Consequently, the company would have to pay taxes at a higher rate than a company with only one plant.

One result could be a reversal in the trend of the past few years toward

MEN

IN THE NEWS



American Chain & Cable Co., Inc.—Wilmot F. Wheeler, Jr., was elected executive vice-president.

Crucible Steel Co. of America— Phillip Erhard was appointed purchasing agent of the Sanderson-Halcomb Works.

Eaton Mfg. Co., Dynamatic Div.— Robert E. Mitchell has been named plant manager.

AC Spark Plug Div., General Motors Corp.—W. T. Gahan was made engineering director on the Thor project in England.

United States Rubber Co.—Gerard W. Brooks has been appointed director of marketing for the tire division.

Alan Wood Steel Co.—Dr. Arthur B. Backensto, Jr., was named research metallurgist.

Minnesota Mining & Mfg. Co.— Robert W. Reeser was promoted to national automotive sales manager for adhesives, coatings, and sealers.

National Malleable and Steel Castings Co.—Lovell Shockey has been made sales manager of the Cleveland Works.

American Steel Foundries—Charles C. Jarchow was elected chairman of the board.

Ross Operating Valve Co.—A. C. Hinz has been made supervisor of sales and engineering for southeastern Michigan.

Borg-Warner Corp., Marbon Chemical Div.—Howard Irvin and Joseph Showalter were elected vice-presidents.



Victor Mfg. & Gasket Co. — Albert J. Aukers has been elected vice-president in charge of industrial soles.



Armstrong Cork. Co., Industrial Div.— E. W. Janes was named field sales manager and C. B. Grove general manager of market development.

Houdaille Industries, Inc., Buffalo Hydraulics Div.—E. L. Spencer and Gervase M. Magrum were named general manager and assistant general manager, respectively.

Sperry Products, Inc.—Frank U. Hayes was appointed president and general manager.

Koehler Aircraft Products Co., Inc.

—Richard T. McCauley has been named general sales manager.

Associated Spring Corp.—E. L. Goff has become senior vice-president; W. E. Froehlich, vice-president—engineering; and F. E. Crist, director of administration.

Electric Storage Battery Co., Exide Industrial Div.—Thomas E. Peacock was named marketing manager.

Parker-Hannifin Corp., Parker Seal Co. Div.—Paul F. Smith was made president; Scott A. Rogers, vice-president; and T. J. McCuistion, vice-president, sales.

Firestone Steel Products Co.—Walter S. Kidder was named general sales manager and W. H. Vaughn, Detroit sales manager.

Chandler-Evans Corp.—Sidney A. Stewart has been named president.

Van Norman Industries, Inc.—Charles F. Myers was elected president.

Hartford Machine Screw Co.—Ernest J. Willson was named engineering manager of the Fuel Injection Div.





Air Reduction Sales Co.—R. E. Lenhard has been named president.

Dana Corp.—W. H. Schomburg, Jr., has been named assistant general sales manager.

Tung-Sol Electric Inc.—E. Leslie Peter was named merchandising manager of automotive markets.

Republic Aviation Corp.—Harley S. Jones has been appointed executive vice-president.

Necrology

George D. Grant, 86, automotive pioneer who helped develop the Grant car, died Jan. 26, at Detroit, Mich.

Robert J. Hoffman, 71, a retired vice-president for industrial relations of Union Carbide Corp., died Jan, 26, at New York City.

Eugene E. Heckman, 70, president and treasurer of Heckman Wire and Iron Works, Inc., died Jan. 24.

Harry K. Smith, 81, one of the founders of the Knox Automobile Co., Springfield, Mass., died Jan. 22, at Watertown, N. Y.

Van Winkle Todd, 66, chairman of the board of Hanson-Van Winkle-Munning Co., died Jan. 15, at Long Branch, N. J.

J. Dillard Collins, engineering vice-president of Hudson Lamp Co., died Jan. 10, at Cranford,

L. B. Sperry, 79, a retired manager of engineering for the farm tractor division of International Harvester Co., died recently at Fort Atkinson, Wis.

Louis E. Vogel, 85, president and treasurer of Wisconsin Machinery & Mfg. Co., died recently at Whitefish Bay, Wis.

AVIATION MANUFACTURING

Chrysler Takes Steps To Stay In Missile-Building Business

Chrysler Corp., currently harrassed by rumors that its missiles program is about to fall out of orbit, is not overly worried about the future. Chrysler has a re-entry plan of its own.

Word around missiles circles is that Chrysler's Jupiter contract will not be renewed at the end of current allocations. This could mean the end of Chrysler as a missile builder, unless there is a new development that Chrysler could pick up.

But Chrysler is not waiting for its Jupiter contract to phase out, and there is some indication that this won't even happen.

New Project Group Formed

An Advanced Projects Organization has been set up at Chrysler to concentrate on concept and planning of new weapon and space system projects. This staff of 50 or so engineers and scientists includes some of the top talent at Chrysler's Defense Group.

John P. Butterfield, formerly executive engineer of the Missile Div., heads the new group.

And according to Thomas F. Morrow, group vice-president in charge of Defense and Special Products, his company is "working in close liaison with the Army on future programs, bending every effort to stay in the missiles business."

There is good possibility that some of the Allied nations will purchase Jupiter missiles of their own to arm tactical squadrons. This could keep Chrysler busy for some time after expiration of the U. S. Army Jupiter contracts.

The Jupiter and Redstone missiles also have been mentioned as the prime booster vehicles for satellite and space probes in the next few years, by the Army and by other agencies.

Untapped Facilities

A tour of Chrysler's Michigan Ordnance Missile Plant near Detroit reveals that Chrysler has untapped productive facilities and ample technology to keep pace with the nation's progress in missiles development.

Morrow says Chrysler is three months ahead of schedule on the

Jupiter and can "meet any demands placed by the government." Cap.city is "several times" current rate of output.

As to Chrysler's technological capabilities, the company is not permitting itself to be labeled as solely a production line operation, synonymous with the automobile industry. Of the 11,600 employes at the missiles plant, only 300 or so are actively engaged in final assembly of missiles.

The others are engineers, technicians and specialists whose work could involve a development prototype (not yet announced) as well

as a production tactical missile like Jupiter or Redstone.

Thiokol Gets Contract For SUBROC Propellant

Goodyear Aircraft Corp. awarded Thiokol Chemical Co. a subcontract to design and build the propellant for the SUBROC propulsion system.

The new Navy weapon, an antisubmarine missile, may be fired from above or below the surface. The SUBROC system can detect a submarine at long range, figure out its speed and course, and fire the missile.



Argosy is designed for passenger, cargo or mixed transport

New Turboprop Air Freighter Makes First Flight in England

The Argosy, a new British turboprop air freighter, made its first flight in England last month.

The multi-purpose aircraft, produced by Armstrong Whitworth, is designed for passenger, cargo, or mixed transport. It is powered by four Rolls Royce Dart engines and cruises on medium range routes at 300 mph at 25,000 ft.

The Argosy's fuselage is sausage shaped and is nestled between two booms. This design facilitates loading and unloading from either end through large doors that extend the

full width of the Argosy's fuselage.

Two commercial versions of the Argosy are being built, the company said. One, the Airbus, can carry 96 passengers on the lower deck and 30 on the upper; the other, the Airferry, is a short haul freighter which can accommodate six cars on the lower deck and 30 passengers on the upper.

Military versions will feature a beaver-tail arrangement for ramp loading and air drops instead of the rear cargo door.

The company estimated the Argosy will sell for \$1.4 million.

New Linde Machine Welds Terrier "Problem" Parts

A new tape-controlled Heliarc spot welding machine is helping to produce "problem" parts for Terrier guided missiles at the Pomona, Calif., plant of Convair Div., General Dynamics Corp.

The Heliarc method allows welding of parts that are accessible from only one side by using a tungsten electric arc which melts through the joints.

The new machine, developed by Linde Co., a division of Union Carbide Corp., produces 2520 spot welds an hour on Terrier control fins. This includes time for loading, positioning, welding, and unloading.

New Electronic Device Aids Hands-Off Helicopter Flight

Hamilton Standard Div., United Aircraft Corp., is producing an electronic device that will aid all-weather operation and hands-off flight for heliconters.

The device, a stabilization amplifier and coupler package, is designed for the automatic stabilization equipment of the Sikorsky S-61 helicopter. The system features plug-in printed circuit and transistorized circuitry.

Besides hands-off flight at all forward speeds, the stabilization equipment enables the helicopter to hover automatically during antisubmarine operations.

Convair Gets Award to Build Atlas Upper Stage Vehicle

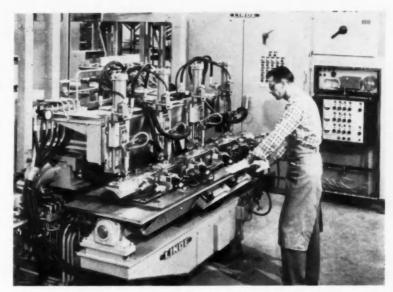
Convair (Astronautics) Div. of General Dynamics Corp. was awarded an Air Force contract to develop and build an upper stage vehicle for the Atlas that could put in orbit a satellite weighing several thousand pounds. First year value of the contract is \$7 million.

As systems manager of the project, Convair-Astronautics will be responsible for everything but the engine. Pratt & Whitney Aircraft, a division of United Aircraft Corp., will develop the upper stage engine under a separate contract awarded last November.

Krafft A. Ehricke, who was named director of the upper stage project, said no basic changes will be needed on the Atlas to accommodate the upper stage.

Navy Chooses Bendix to Design And Build Eagle Guided Missile

Bendix Aviation Corp. was picked by the Navy to design and build the



Heliarc spot welding machine produces 2520 spot welds an hour

Eagle, a new long-range air-to-air guided missile.

The Eagle, which has been under study for three years, marks a new trend in guided missiles, the Navy said. The aircraft from which the Eagle is launched may be relatively slow. The high-performance will be built into the missile, not the plane.

Prime contractor for the Eagle missile is Bendix Systems Div., Ann Arbor, Mich. Bendix Research Laboratories will develop the electronic guidance, and Bendix Pacific Div. will be responsible for systems fabrications, missile flight control, and support equipment. Grumman Aircraft will build the missile airframe and ground handling equipment.

The Eagle will be used for fleet air defense and interceptions.

Dayton Forms New Firm to Make Safety Equipment for Jet Travel

Dayton Rubber Co. formed a new subsidiary to develop and make passenger and pilot safety equipment for jet and space travel.

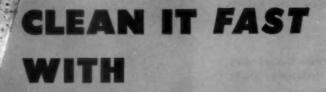
Initially, the new firm, named Strato-Safety Mfg. Corp., will produce oxygen hose, oxygen masks, and survival kits for jet travelers, as well as chemical hoses for guided missiles at its Torrance, Calif., plant.

Clowes M. Christie, Dayton president, was appointed head of the new subsidiary, and Edward M. Rothermel executive vice-president and general manager. Rothermel was formerly director of chemical development at the company's Waynesville, N. C., plant.



CONVAIR 880 TAXIS DOWN THE RUNWAY

Convair 880 moves down the runway at Lindberg Field, San Diego, on its initial taxi tests. Convair test pilot taxied the plane the length of the field four times and lifted the nose wheel off the runway. Plane is scheduled to make its first flight after nine days of ground vibration testing at the Convair dynamics test laboratory.

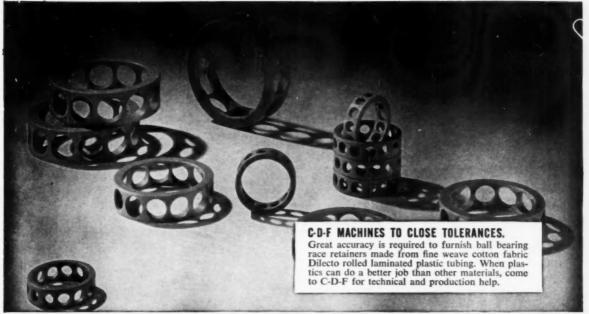


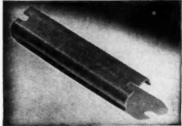
ROTOBLAST

Pangborn now offers even greater blast cleaning savings with new high-capacity ROTOBLAST units throwing up to 160,000 pounds of abrasive per hour. To see how these ROTOBLAST units are incorporated in Pangborn's new machines for rotoblasting castings, forgings, hot rolled steel, super alloys, etc. write . . .

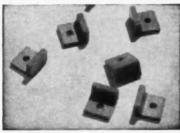
Pangborn

PANGBORN CORPORATION, Hagerstown 11, Maryland
Manufacturers of Blast Cleaning and Dust Control Equipment





C D F PIONEERED IN POST-FORMING of laminated plastics. This technique gives you stronger, more versatile insulating parts with lower costs. This aircraft channel strip is an example of simple post-

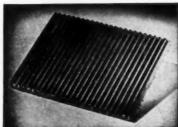


CDF DOES THE UNUSUAL. These rubbing blocks are made from fine-weave cotton cloth Dilecto molded tubing that has been pierced and cut. The part gains in mechanical strength - the product gets longer service life.



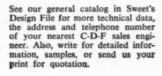
C D F SPECIALIZES IN AUTOMATIC SCREW MACHINING of plastic components. These breaker arm bushings are made from Dilecto paper base rolled tubing on high speed machines by men who know and use cost saving methods.

Yes, CDF is a big reliable source for fabricated plastics!



CDF SERVES MANY INDUSTRIES with fabricated specialties. A great amount is concentrated in the automotive and allied fields. This aircraft part has a corrugated surface on a strong woven asbestos laminated base.







CDF IS A PUNCHING SPECIALIST on these starter solenoid insulators. This is XX-26 Dilecto molded channel strip, pierced and punched to length. Special C-D-F punching grades give you lower costs, faster assembly, fewer rejects.



C D F COMES UP WITH THE ANSWERS to insulating problems. These unique snap-in grommets are easy to insert, spring out and hold tight. Write for samples. The chances are that C-D-F is already making the answer to your problem.



ONTINENTAL-DIAMOND

A SUBSIDIARY OF THE Book COMPANY . NEWARK 2, DEL.



YOU USE GRAY IRON CASTINGS

and are seeking QUALITY ...

Shown is the core of a hydraulic valve casting. A typical example of an intricate casting where quality is paramount.

.. and SERVICE

49 lb. manifold

We realize your production depends on prompt, promised deliveries by your suppliers. Our business was founded and has grown because of the service we have constantly maintained.

and assistance in solving really technical problems

We have been making castings for over sixty years, but do not depend entirely on this valuable experience of time. We employ 3 graduate metallurgists in a modern laboratory who keep constant watch over our metals and foundry sand. And, of course, their vast knowledge is always available to help you solve your design or casting problems.

you're on the right track when you call on



THE GRAY IRON DIVISION OF GENERAL MALLEABLE CORPORATION

710 EAST MAIN STREET

WAUKESHA . WISCONSIN



160 lb.

radiator tank

50 lb. valve

Technical data for gasket design and selection

NUMBER NINE

How to get better sealing at no extra cost in fiber sheet gasket applications

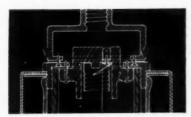
Economy is among the most important design objectives, whether it be an opportunity to reduce costs or a way to improve performance at no increase in price.

A new beater-saturated gasket material—Accopac N-852—is delivering such economy in a variety of applications where conventional plant fiber gaskets have been used.

In every case, N-852 was used at no increase in cost, and in many instances, this new material delivered a substantial bonus in better performance

Accopae N-852 is made by a process pioneered and patented by Armstrong. In this process, cellulose fibers are combined with a synthetic later binder and formed into dense, homogeneous sheets of unusual uniformity.

The binder in N-852 cannot be volatilized or extracted in any recommended application. As a result, gas-



The efficiency of this vapor-tight light fixture was reduced when binder in a conventional plant fiber gasket volatilized and condensed inside globe. The non-extractable binder in N-852 helps eliminate problems of this type.

kets cut from this new material will not shrink in use or in storage.

Accopae N-852 is recommended for any sealing job where glue-glycerine saturated materials are now being used. Typical applications are in caps for gasoline tanks and radiators, master cylinders for brakes, gear case covers, and hand hole covers.

N-852 is available in sheets, rolls, or die-cut parts. It can be obtained direct from Armstrong or locally through Armstrong Approved Gasket Fabricators throughout the country. Write to us for more information on Accopae N-852—or a list of Armstrong Approved Fabricators.

Free wall chart helps assure positive seals and guides in proper gasket selection

Leaks in gasketed joints are at times attributed to such things as compression set or torque loss, when the real problem is simply that the flange load is too low to maintain a seal.

To be sure of adequate unit loads, two things must be considered. The on bolt threads results in wide variations in bolt efficiency. Such friction soaks up bolt torque, often to the extent that actual pressure is only a small fraction of pressure anticipated on the basis of bolt torque calculations.

These possible variations in bolt

efficiency point up the need for a method of estimating what percentage of the indicated torque load is dissipated in overcoming varying degrees of thread friction.

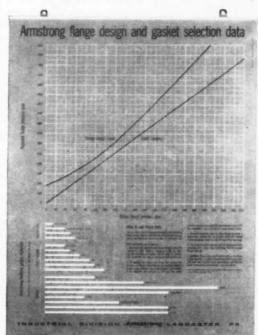
Research engineers at Armstrong have established by original laboratory procedures the seal points of Armstrong resilient gasket material. In addition, they have developed a simple method of converting apparent flange pressures to actual flange pressures, taking into account a wide range of bolt thread conditions.

This data takes much of the guesswork out of flange load calculations and gasket selection. It gives a designer reasonable certainty of getting loads that will equal or exceed the minimum required for the various Armstrong

sealing with the various Armstrong materials.

The new method is discussed in de-

The new method is discussed in detail in the Armstrong Gasket Design Manual, and its major points are consolidated for easy reference on an 18" x 23" wall chart. Copies of the manual and chart are offered at no charge. Please request them on your business letterhead only, addressing your inquiry to Armstrong Cork Company, Industrial Division, 7102 Imperial Ave., Lancaster, Pennsylvania.



This $18^{\prime\prime}$ x $23^{\prime\prime}$ wall chart simplifies flange load calculations and guides in selection of proper gasket material.

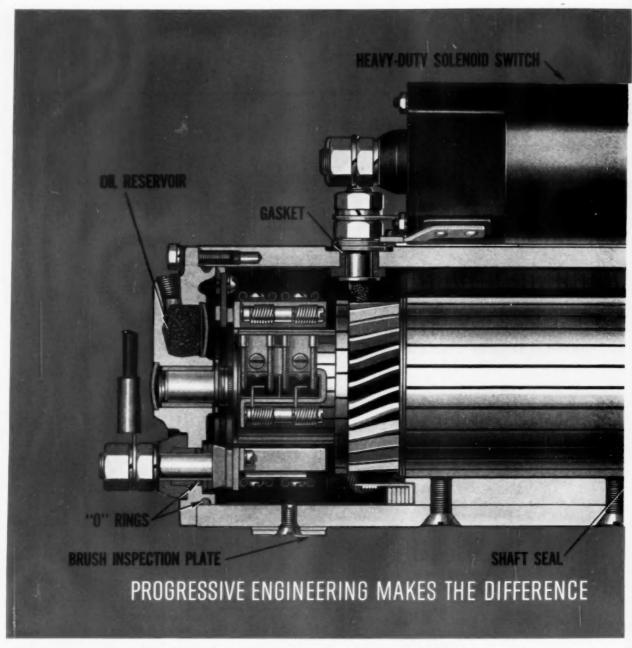
first is the "seal point" of the particular gasket material, i.e., the unit pressure required to form a seal. This point is frequently underestimated. It varies widely, even among materials of the same general class.

The second thing is the actual unit load on the gasket, as contrasted with the apparent load arrived at mathematically by converting bolt torque to bolt load.

The apparent load and the actual load rarely coincide, because friction

Armstrong GASKET MATERIALS

. . . used wherever performance counts



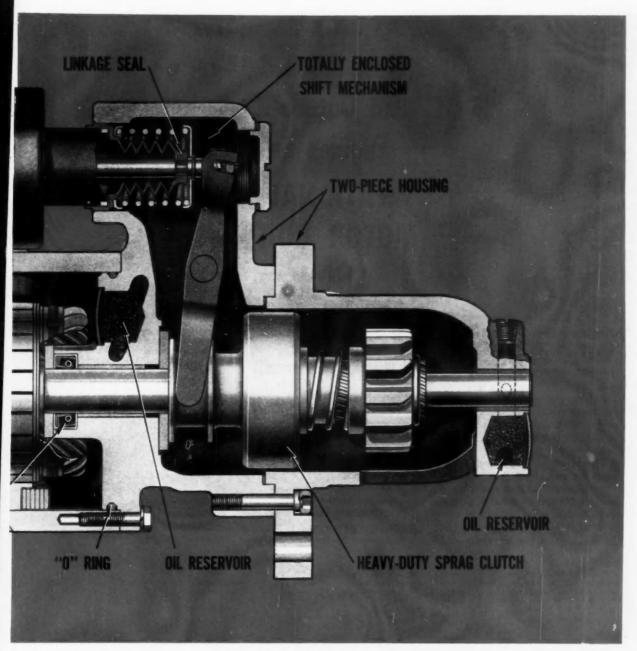
ANNOUNCING THE NEW DELCO-REMY TOTALLY

Delco-Remy now offers a completely new series of solenoid-operated, over-running clutch type heavy-duty cranking motors with the shift mechanism entirely enclosed. Special two-piece drive housings can be assembled to permit a total of 24 different solenoid positions with respect to motor mounting. New 50% longer brushes, together with sealing rings (optional) and large oil reservoirs (optional), assure extra-long operating time between overhauls. And Delco-Remy design features keep these heavy-duty cranking motors positively engaged until the engine starts. Engine manufacturers are

invited to write directly to Delco-Remy for complete information and engineering assistance on the application of these new motors.

TOTALLY ENCLOSED DRIVE SHIFTING MECH-ANISM is protected against dirt, water, slush and ice. This enclosure plus the shaft seal and linkage seal also prevents transmission oil leakage.

TWO-PIECE DRIVE HOUSING DESIGN permits 24 different solenoid positions. Nose housings available in S.A.E. #2 and #3 mountings.



ENCLOSED HEAVY-DUTY CRANKING MOTORS

HEAVY-DUTY SOLENOID AND SWITCH provide positive pinion engagement and safely handle maximum starting current. Special seals increase contact life.

SPRAG CLUTCH DRIVE operates with non-chamfered ring gear. Pinion indexes on spiral spline, positively engages ring gear before power switches on, and does not become disengaged with sporadic engine firing.

HEAVIER BRUSH INSPECTION PLATES resist damage from use and handling—are sealed to prevent leakage to motor interior.

GENERAL MOTORS LEADS THE WAY-STARTING WITH

Delco-Remy



ELECTRICAL SYSTEMS

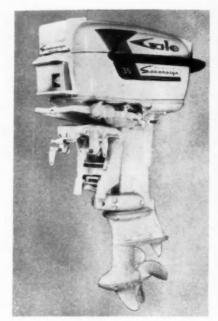
DELCO-REMY . DIVISION OF GENERAL MOTORS . ANDERSON, INDIANA



West Bend Golden Shark, new this year, is a two-cylinder outboard of 42.18 cu in. displacement, rated 40 hat 4750 rpm. Its manual starting version, designated 400 series, is shown

New Inboard and Outboard Engines at NATIONAL MOTOR BOAT SHOW

By Charles A. Weinert



Gale's new Sovereign outboard motor has two cylinders of 40.5 cu in. displacement and is rated 35 hp at 4500 rpm. It comes in both electric lillustrated! and manual-starting models

Among the features at the 49th National Motor Boat Show was the introduction, by two builders, of new large-size inboard marine engines—indicative of the progress growth of this industry. The displays of smaller-size inboard engines likewise included several new models. Here there is a continuing trend to increased power, V-type designs, low silhouettes and

compactness, and lighter weight through use of aluminum.

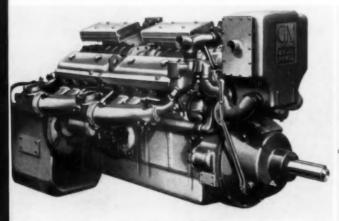
Some of the makers of outboard motors also showed new models. As a whole, those offered have essentially the same horsepower ratings as last year—with new styling, provisions for quieter operation, and mechanical refinements—at the same or reduced prices.

Sponsored by the National As-

sociation of Engine & Boat Manufacturers, the show was held at New York's Coliseum, January 16-25. Altogether there were 396 exhibits of boats, engines, and marine accessories. Twenty-five of the exhibitors showed inboard engines and outboard motors. Boats on display ranged in size from 6 to 46 ft in length, and numbered more than 430.

GM's new Series 71 marine Diesels are available in single units of 6, 8, 12 and 16 cylinders. When twinned and turbopowered, the 16V-71 illustrated boosts the GM power range to a top of 1650 hp

Gray has two new Fireball V-8's, both of 250-cu-in. displacement, rated 135 hp at 4000 rpm and 170 hp at 4400 rpm





It appears there is a distinct trend toward more use of fiber glass in boats. This was made apparent from the fact that about 150 (more than one-third) of all the boats at the show were made of reinforced plastic. At the 1958 show, fiber glass accounted for about 25 per cent of all boats in the show; while two years ago it held 18 per cent of the total.

The exposition this year, as is usually the case, drew a very large attendance, estimated at close to 350,000 persons. It reflected the increasing public interest in recreational craft and the continuing expansion of the industry. Last year's business was the highest yet—up, dollarwise, about nine per cent over the prior record-level of 1957.

This article, insofar as details of the exhibited products are concerned, will lay emphasis on the new engine developments. Brief descriptions of these are contained in the following:

Ailis-Chalmers Mfg. Co.

The first marine version of the new Model 16000 Diesel (AI January 15, page 68) was shown in the Allis-Chalmers' exhibit. Of the sixcylinder-in-line, four stroke type, it has a bore of $5\frac{1}{4}$ in. and stroke of $6\frac{1}{2}$ in. for a total piston displacement of 844 cu in. Maximum rated horsepower is 230 at 2000 rpm. Weight of the basic engine is around 3000 lb.

The redesigned Model D-273 marine Diesel, rated 85 hp at 2800 rpm, was also on display. This sixcylinder, four-stroke model has a bore of 3¾ in. and stroke of 4½ in., for a total piston displacement of 273 cu in. Its weight is in the range of 900 to 1000 lb. Modifications include re-arrangement of the accessory drive, and current use of Roosa fuel injection pump and C. A. V. nozzles.

Chrysler Corp.

A new V-8, called the Sea-V, has been added to the Chrysler line of inboard marine engines. Rated 177 hp at 3600 rpm, it has a bore of 3.91 in. and stroke of 3.31 in. for a total displacement of 318 cu in. Compression ratio is 8.2:1. Its height above the propeller shaft is only 15 in. Weight of the engine, with straight drive, is 898 lb.

Gray Marine Motor Co.

Two new V-8 inboard engines have been introduced by Gray, which is now offering a total of 22 gasoline and 6 Diesel models in the power range from 25 to 225 hp.

The new 135-hp and 170-hp Fireball gasoline engines are companions to the 225-hp Graymarine Fireball V-8 introduced late in 1957. Both of the new engines have a bore of 31/2 in. and stroke of 31/4 in., for a total piston displacement of 250 cu in. Compression ratio on both is 8.4:1. The 135-hp engine has a single-barrel carburetor and the rating is at 4000 rpm; while the 170-hp has a twin carburetor and is rated at 4400 rpm. Equipment on the three V-8's includes Warner "Velvet Drive" hydraulic transmissions as standard. Each, with reduction gear, weighs about 1000 lb.

Dearborn Marine Engines, Inc.

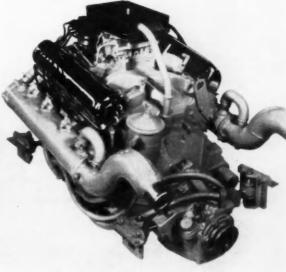
Featured this year in the Interceptor line is a new and larger V-8 inboard engine of 361 cu in. displacement, rated 256 hp at 4400 rpm. It has a bore of 4.05 in. and stroke of $3\frac{1}{2}$ in.; and compression ratio is 8.6:1. With direct drive its weight is about 875 lb dry. The engine has machined, wedge-shaped combustion chambers, and is equipped with oil coolers and a fourbarrel carburetor.

(Turn to page 100, please)

Chrysler Sea-V, a new addition to the line, has a displacement of 318 cu in. and is rated 177 hp at 3600 rpm

Dearborn's latest and biggest Interceptor engine is a 361cu-in. V-8 with a rating of 256 hp at 4400 rpm





AUTOMOTIVE APPLICATIONS

of **Nickel** and its Alloys

Numerous Advantageous Properties of White Metal Make it Suitable for Many Protective and Functional Uses

ICKEL is unquestionably one of the most important metals used in engineering, design, and construction. Ranking high in the world's consumption of metals, it is a white, malleable, non-corrosive substance with singular strength, relatively good heat conductivity, and excellent heat-resisting properties. These characteristics make nickel advantageous for many uses where other metals are not suitable.

In addition, nickel is one of the most versatile materials known. To a marked degree it imparts its silver-like color to the alloys in which it is used. It likewise tends to transmit in varying proportions its other properties along to the alloys of which it becomes a part. There are, in fact, more than 3000 useful commercial alloys containing from a fraction to nearly 100 per cent nickel.

As an alloying element in iron, steel, copper, and aluminum (see Table I) the improvements imparted to the alloys by nickel are well recognized and established. In small percentages it toughens and strengthens iron, steel, and copper alloys. It causes aluminum alloys to maintain strength at elevated

temperatures. In larger quantities, particularly when combined with chromium, it makes iron and steel corrosion and heat-resistant. Nickel also imparts special magnetic properties to iron and has a marked effect on its coefficient of expansion.

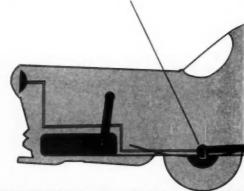
The hard or "high" nickel alloys—those containing more than 50 per cent nickel—are in a class by themselves, as they have physical

and mechanical properties not readily duplicated by other base alloys. These alloys are characterized by exceptionally high corrosion and heat resistance, toughness, and high ratios of strength to ductility in all conditions of mechanical and thermal treatments. The mill products of the high nickel alloys have been classified into several main groups according to their respective compositions. The type and

REAR AXLE

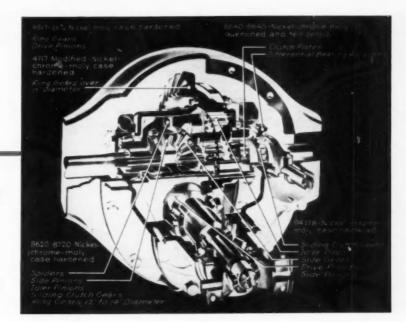
Drive pinion Differential pinions Side gears Ring gear Bearings

By Andrew W. Shearer



PRESENT AND POTENTIAL APPLICATIONS OF NICKEL IN A PASSENGER CAR

(including plated parts)



Cutaway view of an Eaton heavy-duty, two-speed truck axle showing applications of nickel alloy steels.

quantity of alloy element (s) added to the nickel determine the group to which the alloys belong. This classification is shown in Table II.

The four grades of nickel, the seven Monels, and the three Inconels are trade names of the International Nickel Co., Inc. The three Hastelloy alloys are trade names of products of the Haynes Stellite Co., division of Union Carbide Corp. The Illium alloy is

manufactured by the Stainless Foundry & Engineering Co. A large number of alloys falling under the nickel-chromium category are made under the specific trade names of other manufacturers.

Nickel and most of the high nickel alloys are available in practically all the commercial forms with only a few exceptions depending on the alloy composition (see Table III). They can be supplied

ELECTRICAL SYSTEM

Radio speaker magnets Generator magnets Turn indicator flashers Ignition parts Voltage regulators Batteries

BODY AND CHASSIS

Bumpers and bumper guards Grilles Headlight doors and trim Tail light doors and trim Door handles and window cranks Horn ring License plate frame Hood and trunk ornaments Emblems Dash trim and instruments faces Window and door trim Body trim

ENGINE

Intake valves
Exhaust valve seats
Choke tubes
Manifold butterfly
valve shaft and disk
Thermostat
Spark plugs
Carburetor needle valves
Turbocharger casing and
diaphragm
Cylinder liners
Aluminum piston bands

TRANSMISSION

Gears Bearings

Back-up light trim Mufflers and tailpipes Windshield wiper blades Gasoline strainer

ACCESSORIES

Directional light trim Heater and defroster Speedometers Rear view mirrors

Clock trim Cigarette lighters Ash trays Radio

RUNNING GEAR

Wheel covers Wheel bearings Hub caps

TABLE I

Principal Element	Nickel Content, Approximate Per Cent	Alloy	Use Corrosion resistance; thermal conductivity radio and electronic tube parts; magneto striction oscillators; coinage.					
Nickel	99.4	Commercially pure wrought nickel						
	90-99.5	Anodes	Plating.					
Nickel and Iron	0.5-9	Wrought alloy steels.	Transportation and earth-moving equipment heavy machinery; low-temperature applications.					
	0.5-5	Cast alloy steels.	Heavy machinery; railroad; steel mill rolls.					
	1-6 and 14-36	Alloy cast irons.	Heavy machinery; machine tools; automotive and diesel engines; brake drums; corrosion resistance; abrasion resistance.					
	30-90	Magnetic alloys	Communications; electrical equipment.					
	14-28	Permanent magnet alloys.	Motor, generator, radio and instrument parts.					
	8-27	Non-magnetic alloys.	Electrical and magnetic equipment parts.					
	5 40	Clad steels	Petroleum, chemical, and food-processing equipment.					
	22-50	Thermal expansion alloys.	Chronometer springs; radio; tuning forks, thermostats.					
Nickel and Copper	2-13 10-30	High-copper alloys. Cupro-nickels.	Instrument and control parts. Tubes and plates in condensers and heal exchangers.					
	25	Coinage alloy.	Coinage.					
	45	Electrical resistance alloys.	Resistance elements; thermocouples.					
	over 50	High-nickel alloys.	Corrosion resistance; strength; chemical petrol- eum and food-processing equipment.					
Nickel and Chromium	80 2-73	Electrical resistance alloys. Special heat-resisting alloys.	Heating elements. Gas turbines and jet engine parts.					
Nickel and Aluminum	1-2.5	Cylinder head and piston alloys. Low-expansion alloys. Bearing alloys.	Automotive and aircraft parts. Automotive and aircraft parts. Automotive and aircraft parts.					
Nickel, Copper and Zinc	5-30	Nickel silvers	Flat-ware; hollow-ware; electrical equipment; telephone equipment; jowelry; zippers; plumbing fixtures; architectural trim.					
Nickel, Copper and Tin	1-15	Nickel brasses and bronzes	Spring applications; bearings; valves; pumps.					
Nickel, Chromium	6-20	Stainless steels.	Corrosion resistance; strength; chemical, petrol- eum and food-processing equipment.					
and Iron	4-85	Heat-resisting alloys	High-temperature applications.					
	35-60	Electrical resistance alloys.	Heating elements.					
Others	0.5-98	Age-hardenable alloys.	Corrosion resistance; strength; special equip- ment.					
	94-98	Nickel-manganese alloys.	Spark plugs; ignition tubes.					
	55-65	Nickel-molybdenum-iron and nickel-molybdenum-chromium- iron alloys.	Corrosion resistance; strength; special equipment.					
	85	Nickel-sillcon alloys.	Corresion resistance; strength; special equip- ment.					

by the mills in hot or forged bars, rods and plates, cold rolled bars, rods, sheet, strip and wire in various tempers; seamless tubing, forgings and castings. Some of the alloys are true casting alloys and are supplied only in the "as-cast" condition. Some of the alloys are supplied clad to steel either on one side or on both sides. Practically all are supplied also as welding rod and wire.

AUTOMOTIVE APPLICATIONS

For many years nickel demand exceeded supply, primarily because of large stockpile and defense requirements. During these "lean" years, many industries (including the automotive) replaced a number of nickel-containing alloys with substitutes which used less nickel or none at all. Some of these sub-

stitutions will probably continue in general use. In other cases, where "downgrading" has not proved satisfactory, nickel will come into its own again now that it is once more in plentiful supply.

The automotive industry is one arena where nickel is fighting hard for a comeback. The losses suffered

by nickel in the constructional alloys field to low carbon steels are probably irrecoverable in some instances. Rear axles for passenger cars represent a good example because carbon steels have worked out well in this application. However, the nickel-bearing steels are more than holding their own in trucks, buses, tractors, farm machinery, and construction equipment where unit loads may be higher than they are in automobiles.

Most significant of all, however, is the fact that the improved availability of nickel and some complaints from car owners have prompted the automobile manufacturers to increase plating thicknesses on 1959 car parts. Thus, nickel usage in 1959 by the automobile industry can reasonably be expected to increase to some six lb per car from a former average of five lb per unit. On an estimated production of 5.5 million cars, this would mean a ready market for some 33 million lb of nickel!

Passenger Car Uses

Nickel alloys, because of their strength, toughness, durability, and corrosion resistance, have contributed much to the efficiency, safety, and durability of the modern passenger car. Steels containing from 0.5 to 5 per cent nickel are used extensively for gears, steering parts, and other vital parts of automobiles; Ni-Cr-Mo irons are used for camshafts. A special nickeliron alloy, whose magnetic properties change with temperature, is used in practically all automobile speedometers to avoid error from changes in temperature.

About 35 per cent of the stainless steel used in a typical car today is nickel-bearing, that is Grades 202, 301, 302, etc.; most of the stainless used for trim is Type 430, a non-nickel-bearing variety. Wheel covers account for the greatest amount, by weight, of nickelbearing stainless. It is used in lesser weights in such important applications as springs and locks, windshield wiper blades, and radio aerials. The roof of the 1959 Chrysler Imperial Southampton is

TABLE II

APPROXIMATE COMPOSITIONS OF HIGH NICKEL ALLOYS

Material Nickel	Copper %	iron	Chromi- um %	Molyb- denum %	Alumi- num %	Silicon %	Man- ganese	Tung- sten %	Carbon %	Sulfur %	Colum- bium %	Titani- um %	
Nickel Low Carbon	99.4*	.1	.15				. 05	.25		.05	.005		
Nickel	99.4	.05	.1				.15	.2		.01	.005		
Duranickel	93.7	.05	. 35			4.4	.5	. 3		.17	.905		
Cast Nickel	97.	0.3	.25				1.6	.50		.50	.015		
Monel	67.	30.	1.4				.1	1.		. 15	.01		
"R" Monel	67.	30.	1.4				. 05	1.		.15	.035		1111
"K" Monel	66.	29.	.9			2.75	.5	.75		.15	.005		
"'KR" Monel	66.	29.	.9			2.75	.5	.75		. 28	.005		
Cast Monel	63.	32.	1.5				1.6	.75		.15	.015		
"H" Monel!	63.	31.	2.				3.	.75		.1	.015		
"S" Monel!	63.	30.	2.				4.	.75		.1	.015		
Inconel	76.	. 20	7.5	15.5			.25	. 25		.08	.007		
Inconel X	73.	.2 max.	7.	15.		.7	.4	. 5		.04	.007	1.	2.5
Cast Inconel	77.5	. 25	6.0	13.5			2.0	.8		. 20	.010		
Hastelloy B	60.		6.		32.		1.	1.					-100
Hastelloy C	51.		6.	17.	19.		1.	1.	5.				
Hastelloy D	85.	3.				1.	10.	1.					-174
Illium	60.	3.	8.	21.	5.		1.	1.	1.				

^{*} Including Cobalt.

TABLE III

AVAILABLE FORMS OF NICKEL AND NICKEL BASE ALLOYS

	Castings	Forgings	Hot- rolled Bars	Cold- drawn Bars	Wire, Cold- drawn	Hot- rolled Plate	Hot- rolled Flats	Cold- rolled Sheet	Cold- rolled Strip	Cold- drawn Seamless Tubing	Welded Tubing
Nickel	x	х	x	×	x	×	x	×	×	x	x
"L" Nickel	-	x	×	×	x	x	x	x	x	x	×
"Z" Nickel			×	х	x				X		
Monel	x	x	x	x	x	x	x	×	X	x	x
"K" Monel	-	x	x	×	×		x		x	X.	
"R" Monel			×	×	x						
"KR" Monel	- Tenan			х	×						
"H" Monel	x										
"S" Monel	×										
Inconel	x	x	X	×	×	х	x	×	x	×	×
Inconel "X"	-	x	X.		x				X	x**	
Hastelloy B	x	X	X.		x	x	x	X.	X	X	X
Hasteloy C	X	X	X		x	x	x	×	x	x	X
Hastelloy D	×				\leftrightarrow						-
Illium .	X	X:	×	x	x	X		×	x		X

^{**} Produced on specific Inquiry.

of Type 302 (a nickel-bearing stainless). Other stainless steel parts, primarily of the 18-8 type (18 per cent chromium and 8 per cent nickel) include some moldings, ornaments, grille bars, steering wheel spokes, etc.

Nickel-bearing stainless steel is also widely specified for the body sections of truck-trailers where it affords the optimum combination of toughness, strength, and corrosion resistance for rugged service.

There are many other stainless

steel functional parts (carburetor and fuel pump parts, top and bottom radiator tanks, transmission oil coolers, etc.), some of which are not nickel-bearing at the present time. However, they could readily become nickel-bearing types in view of the improved nickel supply situation and the advantages which nickel imparts to stainless for certain applications.

A number of experimental clad stainless steel bumpers for passenger cars have been made. Bumper stock 18 in. thick with 10 per cent clad one side would have the same nickel content as a nickel-chromium plated bumper. Stainless steel mufflers and tailpipes have also been under consideration, and their introduction on a wide scale would also provide a sizeable market for nickel.

Due to the good corrosion-resistant properties of nickel, its favorable physical properties, and its ease of deposition, nickel plating finds numerous and diversified applications on the modern car. The protection of automobile bumpers alone requires hundreds of tons of nickel every year. Now that the nickel shortage is over decorative platers are taking a much closer look at plating specifications and standards, and are experimenting with new and other ways to check quality. Nickel thicknesses are being stepped up on die castings of various types, and most manufacturers have increased the thickness of nickel on brightwork in the 1959 models.

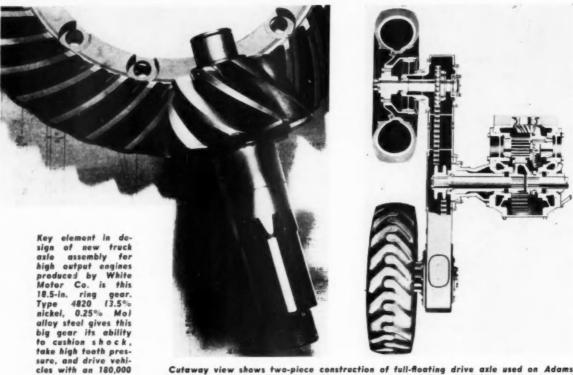
A few of the many present and potential applications for nickel plating on passenger cars include: bumper and bumper guards; grilles; headlight doors and trim; tail light doors and trim; door handles and window cranks; horn rims; license plate frames; hood and trunk ornaments; directional light trim; emblems, etc. A number of others are shown on the phantom car diagram depicting application of nickel and nickel-base alloys.

It is in the area of functional parts, however, that nickel alloys assume their most important role in automotive applications. When manufacturing economy and wear resistance are vital factors, and thermal expansion must be considered (valves and engine cylinder liners, for example) the high-nickel and nickel-copper cast irons are used. Referred to as Ni-Resists, these alloys are used in ring bands for aluminum pistons, valve seats in aluminum heads, valve guides. cylinder liners where corrosion becomes a problem, exhaust lines where temperatures reach 1250 F or more, and in turbocharger cas-

Available only in cast form.

x Available.

⁻ Not Available.



Cutaway view shows two-piece construction of full-floating drive axle used on Adams 660 motor grader. Type 4340 H steel containing 1.55% to 2.00% nickel is used in this vital 3.5 in. diam member.

- AXLES --

Ib GCW over mountainous terrain.

ings and diaphragms.

Obviously, lightweight engines with aluminum blocks currently in the prototype stage afford many opportunities for expanded uses of nickel alloys. By the same token, aluminum brake drums lined with one per cent nickel cast iron resist wear and heat checking from high-speed stops, as in the Mercedes-Benz SL-300 roadster. Should the gas turbine passenger car ever become a production reality, a tremendous new demand would be created for nickel.

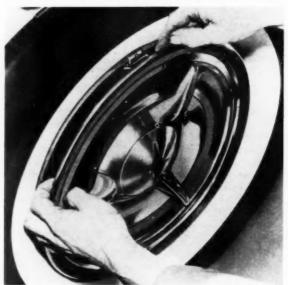
While valve seat inserts in passenger car engines went by the wayside for the most part with the advent of the overhead-valve V-8, they continue to be used in two six-cylinder L-Head engines still being produced. It is reliably reported, however, that a number of automobile manufacturers are considering using valve seat inserts again.

The high-grade nickel alloys, such as the more than 55 different types produced by International Nickel Co., find a host of applica-

tions in the modern passenger car. Automatic choke tubes, carburetor needle valves, gasoline strainers, and spark plug electrodes are but a few examples. An interesting case history has come to light re-

The thousands of stainless steel wheel disks installed on passenger cars each year consume a sizeable poundage of nickel. One shown here is made of MicroRold Type 301 chrome-nickel austenitic alloy. (Washington Steel Corp.)

PASSENGER CAR, SNOW FREIGHTER, AND TRACTOR APPLICATIONS



garding a nickel alloy application which clearly demonstrates that the physical advantages of nickel may often outweigh a slight price differential with other materials.

Up until about five or six years ago, Carter Carburetor Co., which makes the carburetors for Buick. used all Monel metal for their needle valves in the carburetors, but then switched to Type 416 stainless steel because of a price advantage. However, some time thereafter Buick advised Carter that it was necessary to have a non-magnetic needle in the carburetor. "Monel 403" was recommended and approved by Buick for the job, because of its highly nonmagnetic properties, and has been doing a commendable job ever since. Other significant automotive functional parts where highgrade nickel alloys are used include distributor parts, automatic choke controls, gasoline fuel pump parts. exhaust pipes, water pump shafts, and instrument parts.

The electrical system is another fertile and vital field for the application of nickel alloys in the modern passenger car. Aside from the spark plug application previously mentioned, nickel alloys find their way into radio speakers and a-c

generators in the form of Alnico magnets. Turn indicator flashers, ignition circuits, headlights, and voltage regulators are just a few examples of other electrical system applications for nickel alloys. The sintered-type of nickel-cadmium battery because of its cost primarily has to date been confined to applications in aircraft and guided missiles, cross-country trucks, military vehicles, railroad Diesels, and commercial marine uses. Another alkaline battery, the nickel-iron type, is used as a power source in industrial fork lift trucks.

FARM EQUIPMENT

Several million pounds of nickel are used annually in farm tractors and implement components. Three general types of tractors are employed in farming—the wheel type driven by a two, four, or six-cylinder gasoline engine; the crawler or tracklaying type, generally powered by a four or six-cylinder Diesel engine; and the hand garden type driven by a single cylinder air-cooled engine.

Wheel-Type Tractors

Taking the wheel-type tractor as a first example, the nickel per unit ranges from 0.5 to 2.30 lb. A fair average would be about 1.2 lb per unit for a total consumption of approximately 300,000 lb of nickel in an estimated total 1958 output of 245,000 wheel-type tractors. Some of the parts using nickel steels would include: steering gears and

sectors; clutch, transmission, power take-off, and brake foot gears; differential and bull pinions; and rear axle. Cast iron parts at present are nickel-free.

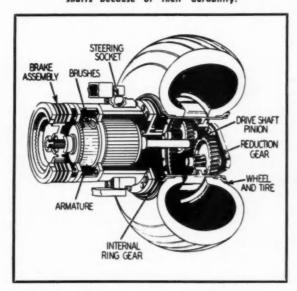
Crawler Tractors

It is almost impossible to use a working average for crawler tractors because of the wide range of sizes made. The weight of nickel alloyed in steels will range from 3 lb to 36 lb depending on the model. Now that surplus nickel is available, the chances appear excellent that upgrading will result as greater horsepower demands are made on mechanical components.

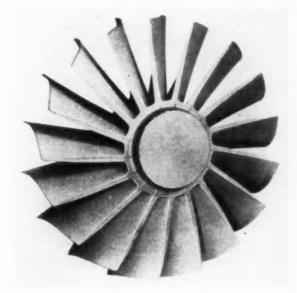
The alloyed grey-iron parts used at present are Ni-Cr-Mo iron Diesel engine heads and 1.25 Ni-.65 Cr iron exhaust manifolds; but, with the increasing trend toward turbocharging, Type II Ni-Resist

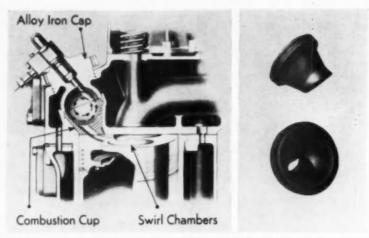
· WHEELS ·-

Heart of the R. G. LeTeurneau Sno-Freighter (see Al, May 15, 1956) is the individually powered electric wheel. Cross section shows motor, gears, and braking system. Types 4820 (3.50% Ni, 0.25% Mo) and 3310 (3.50% Ni, 1.55% CrJ alloy steels were selected for the gears, pinions, and shafts because of their durability.



Shown here is a close-up of an integral wheel investmentcast of Hastelloy alloy B (60% nickel) for use in turbocharger developed for Caterpillar D9 tractor by AiResearch Industrial Div. (Haynes Stellite Co., Division of Union Carbide Corp.)





SPECIAL COMBUSTION CHAMBER .

A Hastelloy alloy C cup (right) is a vital part in a special combustion chamber incorporated in Diesel power units made by Waukesha Motor Co. It has good strength, corrosion resistance, and will hold heat (Haynes Stellite Co., Division of Union Carbide Corp.)



Layer of nickel plating under chromium deposit protects these R. E. Dietz brass automotive lighting equipment parts from corrosion. shown include fog light and spotlight at top, markerclearance light in middle, and turn signals at bottom.

· AUTOMOTIVE LIGHTING EQUIPMENT ·



. VALVE TAPPETS .

Valve tappets, cast by Wells Mfg. Co. of 2% nickel cast iron containing vanadium and molybdenum, are replacing chilled iron and hardened steel lifters which have suffered excessive wear and pitting in some high speed engines.

will have to be used for exhaust manifolds (1450 F), and turbocharger housings of this alloy may well become standard crawler tractor equipment.

Following are some of the crawler tractor parts in which nickel steels are used: motor supports; track frames; stabilizer arms; power take-off gears and shafts; transmission, bull ring, and belt pulley gears; and engine clutch, clutch drive, steering clutch, transmission, sprocket drive, and belt pulley shafts.

CONSTRUCTION

The severe service conditions to which earthmoving, roadbuilding machinery, and other types of construction equipment are subjected recommend the use of nickel alloy steels in such parts as power shovel dipper sticks, booms, and buckets; bulldozer push arms and frames; concrete mixer drums and blades; scraper blades; snow plows; tractor frames; motor supports, equalizer arms and drawbar supports.

Off-Highway Trucks

Mechanical components in loadon-back off-highway trucks require from 10 to as much as 30 lb of nickel on the largest unit; the average runs around 20 lb, not including Ni-Cu or T-I Steel. Production of these trucks in 1958 likely ran around 4600 units for a total nickel consumption of 92,000 lb, excluding Ni-Cu and T-I. Examples of nickel steel parts in off-highway trucks are: differential and universal spiders; axles, transmission, differential, and axle gears; jackshafts, and planetary gears and shafts. Transmission and differential housings and wheel hubs are of ductile cast iron, while turbocharger housings and exhaust manifolds are of Ni-Resist; bodies are Ni-Cu and T-I steel.

Crane Mounting Trucks

The steel components of the mechanical drives of trucks for mounting cranes, shovels, and draglines weigh variously from 300 lb to 2000 lb. In some units not all of the parts are nickel steel. However, since the major portion are, it would be reasonable to estimate that nickel used ranges from 5 lb per unit to 30 lb in the largest. Typical nickel steel parts used in these trucks would include: transmission gears and shafts; universal spiders and shafts; differential ring and side gears; rear axles; clutch shafts; sprockets; clutch plates and shoes; and chain pins and side bars.

Booms for the cranes and draglines are invariably made of highstrength, low alloy steel of the Ni-Cu types in which nickel will be present in the range of 0.40 to 0.80.

(Turn to pafie 93, please)

Special, Low-Cost Machines at Rock Island Plant of J. I. Case Co.

Natco adjustable spindle drill with automatic indexing

Natco adjustable spindle drill with automatic indexing mechanism (front to back) for drilling and reaming the attaching holes for the hydraulic unit and the cover plate. The hydraulic indexing unit was built and installed by J. l. Case Co.

HE Rock Island plant for J. I. Case Co. produces tractors for the company's agricultural and industrial line, and parts for other plants in the Case company. When the plant was being geared for production of parts for the tractor, a sharply limited budget was set up for the production equipment. Case engineers have shown their ingenuity in setting up production lines in which many special high production machines were developed by the plant staff from standard machines.

The line for machining the transmission case, a gray iron casting that forms part of the tractor frame between the torque tube and the power take-off housing, or rear cover plate on certain models, was built up almost entirely from surplus machines. In some cases these were bought as used machines, stripped to little more than the base casting, and standard machine heads and other units were purchased and mounted on them. The result is a production line of special machines that represents a minimum capital outlay.

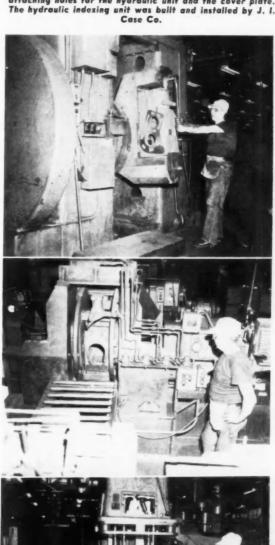
First operation is the straddle milling of two faces on a Kearney & Trecker duplex milling machine. The casting then goes to a drilling machine where the attaching holes for the hydraulic unit and the cover are drilled. On this machine a specially built hydraulic indexing device moves the fixture and workpiece horizontally to ream locating holes for subsequent operations. The machine itself was built up from a Natco multiple spindle drilling machine, with a special hy-

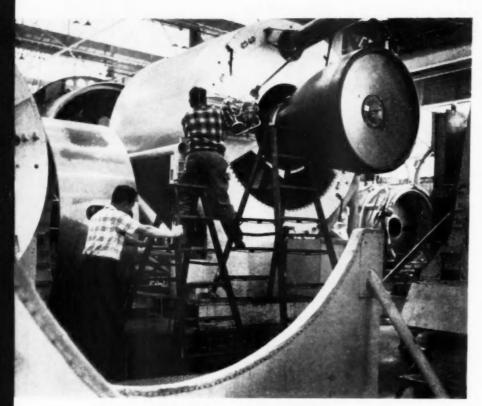
(Turn to page 110, please)

Milling the mounting faces for the
rear axle housings
on an Ingersoll
drum mill with
continuous cycle.
A rough and finish
cut is taken on
each side.



Drilling the bottom mounting pads on a Baush multiple drill with a slip spindle location can be changed with a minimum of expense when engineering change occurs.





Adjusting Thor's vernier engines

PRESENTED here are some selected views of Douglas Aircraft Company's production line where the Thor intermediate range ballistic missiles are being assembled for delivery to the U. S. Air Force.

Associated with Douglas in the project under the over-all direction of the Ballistic Missile Division are four major contractors. They are: Space Technology Laboratories, for management of the weapons system; Rocketdyne Division of North American Aviation for propulsion; A C Spark Plug Division of General Motors for guidance; and General Electric Co. for nose cone and warhead.

The engine is currently in production at Rocket-dyne's plant in Neosho, Mo., while research and development activities on advanced versions are being conducted at the division's main plant in

Welding and grinding welds, and installing fittings on Thor bulkheads



CONDENSED SPECIFICATIONS of the THOR PROPULSION SYSTEM

Application

Thrust

Description

Current Model Propellants

Propellant Supply

Component Power Source

Thrust Chamber

Combustion Temperature Air Force Thor intermediate range ballistic missile

Air Force two-stage test vehicle (booster propulsion)

Air Force space probe vehicle (booster propulsion)

About 150,000 lb Single main chamber, twin verniers, liquid propellant

MB-3 XLR79NA-9 RP-1 (fuel) Liquid oxygen (oxidizer) Twin pumps driven by a single turbine

Above 5000 F.

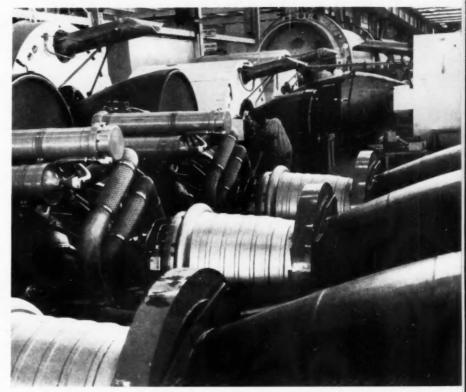
Gas generator
Main engine: Tubular
walls for circulating
fuel as coolant
Verniers: Double-wall
construction
Not releasable
First engine test:
November, 1955
First production engine:
September, 1957
First flight test:
January, 1957

Dimensions History

Intricacies of THOR Missile Production

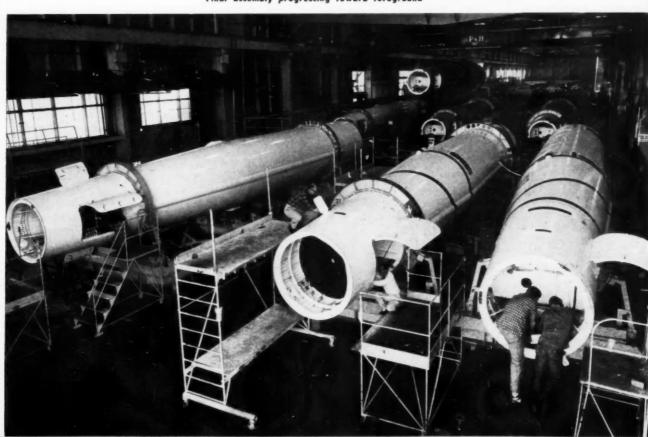
Canoga Park, Calif., and its nearby Propulsion Field Laboratory, test site for Rocketdyne.

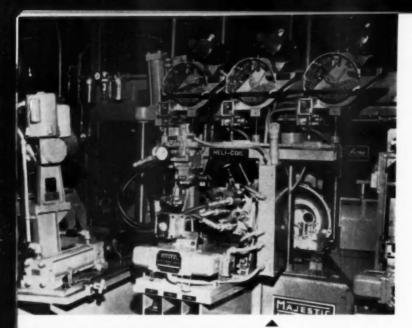
Only a small portion of the Thor ground support equipment is built in Santa Monica. A major share is in production at Douglas plants in Long Beach and El Segunda, and in sub-contracting firms throughout the country.



Rocketdyne engines in the foreground, powerplant installation in the background





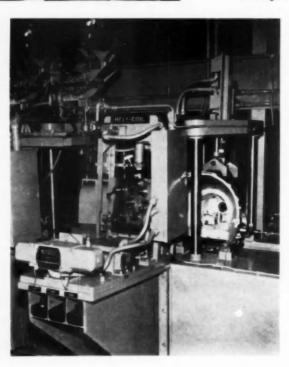


New Assembly Techniques for Aluminum Transmission Housing



Above each inserting unit, three hopper units are equipped with arms that retate through the hopper pan loaded with inserts which are picked up at random and automatically oriented. The insert is prewound and as the tools move to the case, the inserts are screwed through a prewinder tip into the transmission case as the tool slide moves forward.

After inserts are fed to each tool, the tools advance hydraulically until the prewinder tips contact the transmission housing. The insert tangs are picked up by slots in air powered rotating mandrels and the inserts are screwed through the prewinder tips into the transmission housing as the transfer carriage moves forward.



Final step in automatic insert installation is tang break - off station. Hydraulically actuated carriage moves break off tools forward until a nylon bushing presses against the housing. The carriage continues to move for-ward, telescop-ing the front portion of the tang break-off tool inside the main body, which causes an impact spring to be compressed. At the end of the carriageforward stroke, the spring is released, driving a hammer into a punch, which in turn breaks off the insert tangs.

NEW aluminum transmission converter housing, developed by the Ford Motor Co. for use with the Interceptor special V-8 engines, is a single-piece casting weighing only 21 lb. It requires not only new handling equipment, but the development of new assembly techniques at Ford's Automatic Transmission Division in Sharonville, Ohio.

Each aluminum housing has a machined starter mounting ring with three tapped holes to fasten the starter to the housing. During the life of the car, Ford engineers felt it would be necessary to occasionally remove the starter from the housing; and the need for threads of higher loading strength and greater resistance to wear brought up an important design consideration.

Accordingly, Ford engineers specified the installation of three 5/16-18 wire thread inserts manufactured by the Heli-Coil Corp. of Danbury, Conn.

Before specifying the use of wire thread inserts, it was necessary to develop automatic inserting equipment for rates compatible with other assembly operations in the transmission plant. Automatic power inserting tools were previously available for volume and production, but it was necessary to develop a completely automatic machine that could be integrated with other operations.

After considerable development work, Heli-Coil engineers built a (Turn to page 114, please)

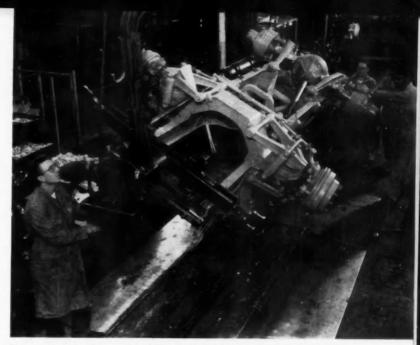
Chassis Frame Fabricated from High Tensile Steel

NE of the noteworthy features of the new line of GMC heavy duty tractors with air suspension all around is a rigid, light weight cruciform chassis frame of fabricated construction. The frame is distinctive because it is fabricated entirely from high tensile sheet and strip stock welded together to form the desired structural shapes. It weighs a fraction as much as a conventional frame.

In making the frame the deep vertical web sections all are sheared from NAX 950, high tensile steel of extremely light gage—1/16-in. Flanges are made of the same material but in heavier gage—1/8-in.

The frame is of all-welded construction, employing seam welds produced by Westinghouse CO₂ are welding equipment. Since only the first of the two heavy duty tractor models is currently in production in the Pontiac, Mich., plant, the volume of frame fabrication is small and is handled in a special area set aside for the purpose. As volume increases the entire setup will be groomed for higher volume and used in the assembly area.

Frame sections have been carefully sub-divided to take advantage of the mechanized equipment for producing straight welds. The Westinghouse equipment for this purpose is mounted on a column, as illustrated, for straight-line welding. It also has freedom of movement radially so as to reach the smaller fixtures mounted on the door near the larger side rail (Turn to page 69, please)



View on the chassis assembly line. Here the fabricated frame with all running gear components in place is seen in the turnover fixture which turns it right side up for movement on the final assembly line.



Westinghouse CO: automatic arc welding head in action making the long, straight welds on the side rail. As shown, the welding head moves forward from the rear, guided by a rail on the side of the fixture. Both right- and left-hand rails are welded in the same fixture.

Automated Press and Welding Lines at Volkswagen Plant

THIS is Part II of a two-part article devoted to production methods at the Volkswagen Press and Welding Shop at Wolfsburg. Part I, which appeared in the January 15 issue of AUTOMOTIVE INDUSTRIES, covered production of roof panels. This final part

PART II

describes pressing and welding operations on the doors.

Door panels are pressed and welded on six major lines with a

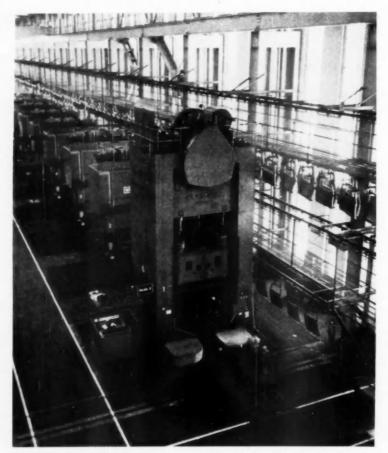
total of 31 machines. Here a high degree of automation is used, with many of the presses linked by loading, unloading and transfer mechanisms, and incorporating semiand fully-automatic assembly of hardware and small components. Some are keyed to a 10-second cycle time in order to produce the two doors needed for each body.

At the start of the sequence are the two basic press lines for the inner and outer panels of both leftand right-hand doors. Runs for each type continue for five days, with complete die sets changed at the week-end.

The inner panel line with seven presses begins with a 600-ton triple-action Clearing whose shuttle loader triggers off spray guns that oil the blank before insertion between the dies. Forming operations include flanging and recessing for the window and access openings.

The panel is raised by lifters and extracted by a gripping device which deposits it on a belt conveyor. It is then hand-loaded into the second press, a 500-ton Weingarten, that punches out the access holes. All subsequent machines on this line, which completely forms the inner pressings, are similar Weingartens with hand loading and mechanical extraction of work.

Inner panels unloaded from press No. 3 are dropped on a three-position conveyor having an annealing and oil-spray unit. A lifting mechanism beneath this unit is actuated by the arrival of a stamping, raising is against the five high-frequency coils which heat the four corners and door lock area prior to the restrike in the



Press line for inner door panels uses a 600-ton triple-action Clearing for the first draw, followed by six 500-ton Weingarten machines. This line makes panels for both left- and right-hand doors, and runs on a 10-second cycle.

By David Scott

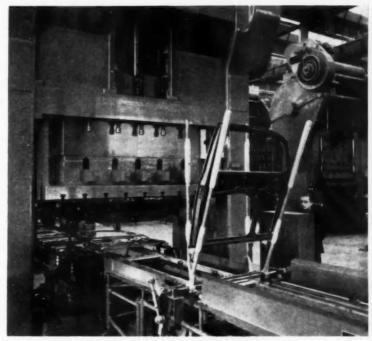
fourth press. A pair of guns then spray it with lubricant.

Presses No. 5 and 6 are followed by turnover devices that receive the stampings from shuttling unloaders, then swing them through 180 deg between a pair of padded forks. Scrap from this and other press lines drops through the floor onto scrap conveyors in the basement leading to a Lindemann baler at the far end of the shop. From there, bales are conveyed directly into railway cars on an adjacent siding.

Door line for the outer panels comprises a triple-action 600-ton Clearing press and three 500-ton Schulers. Between the second and third machines is an extended shuttle conveyor which includes a turnover, a multi-coil induction heater for annealing, and a separate oil spray unit. This equipment is similar to that on the inner panel line.

Completed outer panels are conveyed by overhead monorail to a three-station transfer welding line built by Keller & Knappich and used for assembling minor components. Hand-loaded stampings are shuttled to the first press, where an operator, seated behind the machine, manually locates several reinforcement strips on magnetic fixtures integral with the upper electrodes. The work is then raised against these pieces for preliminary spotting to its upward-facing surface.'

Behind the second press another operator loads vent window frames onto a fixture carried on a long pivoted arm. Depressing the palm buttons causes the arm to swing around beneath the electrodes to

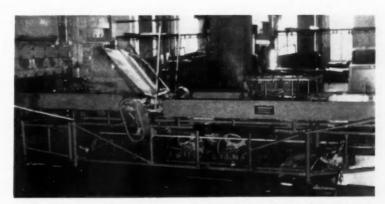


Crank-operated turnovers following the fifth press on the inner door panel line swings stampings through 180 degrees onto the shuttling conveyor.

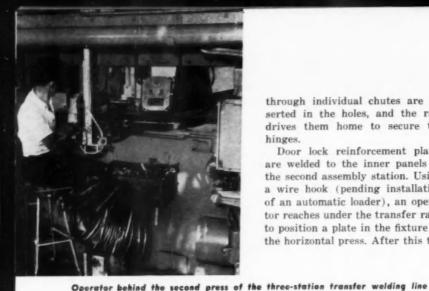
which the frame is magnetically transferred for a similar tacking operation. At the third station all these components are finish-welded. There are two identical lines for left- and right-hand panels.

The final 7-station transfer assembly line for doors, again duplicated for both sides, starts with riveting the hinges to the inner panel. The pressing is first manually placed on the high-level shuttling conveyor which carries it directly over the twin hydraulic rams, then drops its leading edge with pre-punched holes between the open jaws.

Previously, an operator seated to one side of this station has loaded a pair of hinges on heavy dual fixtures which cross-traverse on rails to a position opposite the rams. After these two functions, rivets fed from rotary hoppers



Extended section of shuttle conveyor between presses on the outer door panel line includes a two-stage turnover, induction-heater for annealing, and oil-spray unit.



through individual chutes are inserted in the holes, and the ram drives them home to secure the

Door lock reinforcement plates are welded to the inner panels at the second assembly station. Using a wire hook (pending installation of an automatic loader), an operator reaches under the transfer rails to position a plate in the fixture of the horizontal press. After this the base block, split in two pivoted sections, clamps in to locate the piece positively.

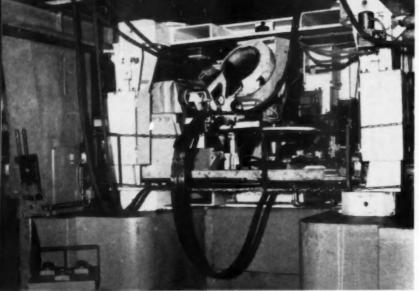
The panel is then lowered with the inside face of its flange contacting the plate, and the multiple electrodes on the air-operated ram make the weld. Following this station is a larger welding press for attaching further small parts.

Included in the welding press at the fourth assembly station is a complex loading mechanism for automatically positioning the two mounting nuts for the interior door handle. Nuts fed from a rotary hopper are guided through individual channels made of spring steel. The outer strips are separated by narrow spacers all of which are loosely bolted together through slotted holes to permit flexing during the vertical movement of the die. Positive feeding of each line of nuts is effected by small air rams with reciprocating pushers.

This press also makes secondary welds at other points. Beyond it. outer panels enter this line at the fifth station, where they are initially mated to the inner pressings with 10 welds. Final joining is done at the next press with a further 70 spots, and components for the window frame and glass channel are added at the seventh and last press.

Other similar lines for the fenders and front frame pressing are being installed by Volkswagen. and it is expected that by next vear the production of cars will reach 530,000. This is in addition to transporters and Microbuses, concentrated at the new Hanover factory which is now turning out 400 a day. Future plans call for moving the engine, gearbox and axle sections from Wolfsburg to Hanover, releasing the main plant entirely for body manufacture and assembly.



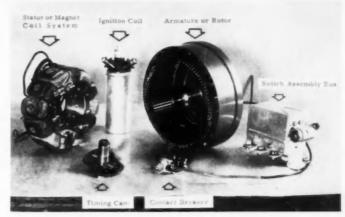


Fourth machine on the door assembly line is a welding press with an automatic loader for interior door handle fixing nuts. A rotary hopper feeds the nuts through flexible guides to the work position on the moving lower die.



Keller & Knappich transfer welding line with three stations adds small components to outer door panels. There are three loading operators, one for the main pressings and two for the minor parts. This line is duplicated for right- and left-hand panels.

Siba Dynastart Combines Reversible Starter and Generator



Basic components of the Siba Dynastart

HE British manufacturers of the German-designed Dynastart, Siba Electric Ltd., of Camberley, Surrey, are preparing a version for possible use in an American 8-cylinder outboard motor that is believed to be larger than any on the market. The unit combines starter and generator, and operates in both directions so that a two-stroke engine can be run backwards in order to eliminate a reverse gear when desired.

Its basic components are an external bell-type armature mounted directly on the crankshaft, a stator with six series and six shunt windings, and (for a single-cylinder engine) a timing cam with two sets of breaker points. When starting the engine it functions as a series motor, but at a certain speed the shunt windings are excited and the driven Dynastart acts as a generator with voltage regulated by a cut-out.

Reversing is effected by stopping the engine, then turning the two-position ignition/start switch the other way. The switch incorporates plunger-operated contacts, actuated by pushing in the key before it is turned, that energize the reversing solenoid in the control box. This reconnects the series windings to run the starter motor backwards, and switches the ignition circuit

to the alternate breaker point (in the spark coil primary) which gives the correct timing for reverse rotation of the engine.

The two-cylinder Dynastart also has two sets of breaker points, but here the ignition wiring to them is interchanged when reversing to meet the altered timing requirements. In addition, the cam is specially profiled for different lift characteristics in the two directions. Siba units for three-cylinder engines are also made, but these are not reversible. British small cars fitted with unidirectional and reversible Dynastarts include the Bond, Berkeley, Frisky and Scoota-

Chassis Frame Fabricated from High Tensile Steel

(Continued from page 65)

fixture. Welding is done from one side, current density being sufficiently heavy to penetrate through to the opposite side of the member. Mechanical welding is done at the rate of 100-in. per minute.

Illustrated here are a number of the fixtures employed for frame fabrication. First of these is the side rail fixture, installed directly adjacent to the automatic welding head. It is designed to make both right- and left-hand rails simply by flipping the fixture over to present the proper side. Another of the fixtures is used for making the sections of the cruciform. Sub-assemblies and the final master framing fixture, at the rear of this area, employ hand welding with hand guns, using Westinghouse CO₂ equipment. Operations on these fixtures involve short welds and welds in places inaccessible to an automatic head. The amount of such welding has been judiciously reduced to the minimum since hand welding is done at a much slower pace—30-in. per minute as contrasted with 100-in. on the automatic head.

One of the sub-assembly fixtures makes up the cruciform assembly together with the large cross tube which becomes an integral part of the section. A large sub-assembly fixture is designed to outfit the side rails with brackets, reinforcements, etc. The master framing fixture then accumulates all of the sub-assemblies and other parts required to make up the complete frame.

Due to the light gages employed for all of the structural elements, it is necessary to have rigid and massive fixture construction coupled with unusual care in making welds so as to reduce heat distortion. In fact, this is one of the major features of the fabrication technique since the finished frame must come out accurately and with close tolerances at many critical points for

(Turn to page 71, please)

Machining With Coated Abrasive Belts

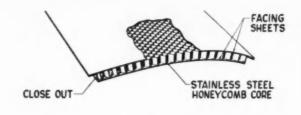


Fig. 1—Basic components of brazed honeycomb sandwich

By M. M. Gilman

Senior Tool Engineer, North American Aviation, Inc. LOS ANGELES INTERNATIONAL AIRPORT

A n increase in sheet thickness of only 0.001 in. will increase the weight of some proposed airframes by as much as a ton. This highlights the need for close tolerances in skin sizing. Abrasive belt machining answers this need.

Another close tolerance requirement is brought about by the increasing use of brazed honeycomb sandwich in present and future airframes. To insure a subsequent braze, our engineering specifications permit a maximum burr tolerance of 0.005 in. and a maximum clearance between facing sheets and core of only 0.004 in as shown in Fig. 1. This close tolerance requirement is again satisfied by the

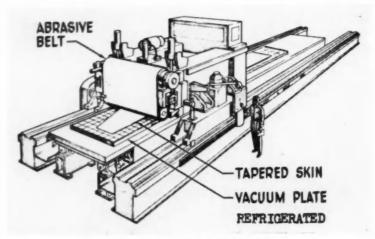


Fig. 2—Abrasive grinding of sheet stock

use of abrasive belt machining.

To best illustrate the potential of coated abrasive belts, following are just some of the methods which are currently being used to advantage, as well as some which are proposed. The Farnham 7 ft by 40 ft abrasive belt grinder, Fig. 2, is capable of grinding large plate and sheet stock up to 86 in. wide and 40 ft long to tolerances of ±.0015 in. The machine is equipped with tracer control which allows grinding of stepped, tapered, or single contoured parts. This is done through the use of a template or cam mounted on the side of the machine. This equipment may also be used for honeycomb, as well as sheet stock.

For stainless steel honeycomb, belt speeds are approximately 4500 sfm. Feed is 18 fpm on this machine. As an example, on 0.0015 in annealed core, approximately 0.004 in. is removed per pass on finish cuts. As much as ½ in. has been removed per pass on a heat-treated core. The belts are 180 to 220 grit, aluminum, oxide, closed coat, waterproof cloth. One man can install and remove a belt very easily. Time required for this operation is approximately five minutes.

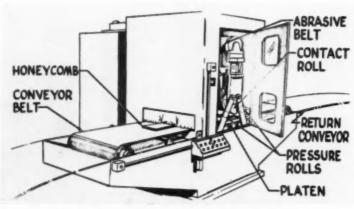


Fig. 3—Abrasive belt grinding conveyor-type machine

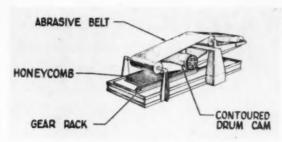


Fig. 4—Abrasive belt grinding double contouring

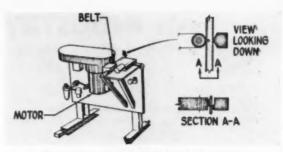


Fig. 5—Abrasive belt sizing close-out details

When machining AM-350 cres sheets, belt speeds are approximately 300 sfm. Feed is 18 fpm. Approximately 0.0005 in. is removed per pass. The belt is 120 grit, aluminum oxide, closed coat, waterproof cloth and is also skived at the splices and flexed 90 deg. Normally the skins are held by a vacuum chuck arrangement, which is an integral part of the machine. However, in those cases where extremely thin skins are to be machined, the skin may be held under tension on a refrigerated vacuum plate which will quickly dissipate the heat and minimize distortion.

The Curtis conveyor-type abrasive belt machine, shown in Fig. 3, is primarily for processing constant thickness honeycomb detail to ± 0.0015 in. In this equipment the honeycomb is fed on a 70 Shore conveyor belt over a platen. The honeycomb is held down to the conveyor belt under slight pressure by rolls as it enters and leaves the abrasive belt. This is probably the most economical abrasive belt machining technique for producing flat and parallel honeycomb details to tolerance requirements. Special hold down methods, such as an ice chuck or cerro-alloy trough, are eliminated by use of this equipment. The abrasive belts are 180 to 220 grit, aluminum oxide, closed coat, waterproof cloth. As an example, on 0.0015 in. annealed stainless steel honeycomb, approximately 0.004 in. is removed per pass. Higher removal rates are possible on heat treated core. Conveyor belt speed on this equipment is 30 fpm. Abrasive belt speed is 4500 sfm. The part is climb cut. The direction of the core is rotated with respect to feed after each pass, to

minimize burring. Any remaining burr is, for the most part, removed with a brass wire brush of a type similar to, but larger than a suede shoe brush. In this manner the burr is maintained within the required 0.005 in. In addition, to maintain the required core thinness tolerance, the contact roller is steel and is dynamically balanced.

Equipment of this basic type is now under development, primarily for mild double-contoured honeycomb parts (see Fig. 4). Flats and tapers may also be machined here. A drum cam forces the grinding belt to the desired contour. This cam is indexed to the table and rotates at the same speed that the table travels. It presents a constantly changing contour as it rotates. It is anticipated that closeout members and core will be ground at the same time to final finish-thus assuring the coordination necessary for a successful braze.

Exceptional tooling coordination can also be attained with this equipment, since stretch press dies and braze fixtures can also be finished here. This is done by turning the belt inside out and grinding the cam, using a master as a basis. Then the belt is returned to its normal condition and using the cam as a basis, the core or stretch press die * is finish machined. With this equipment, high removal rates are possible over a wide area. Belts have been made as wide as 100 in. and can be made wider. Equipment of this type appears to be the answer to meeting production needs for machining double contoured honeycomb core.

Another application of abrasive belt machining now under development is that of sizing close-out members for brazed honeycomb assemblies (see Fig. 5). This is especially important since it is almost impossible to form close-out details to the required ±0.0015 in. tolerance by either hot or cold forming means. With this method the final few thousandths can be removed to bring the details within brazing tolerance requirements. This method is adaptable to close-out members for constant thinness honeycomb panels—contoured or flat.

The foregoing is from a paper presented by the author at the SAE Aircraft Production Forum, 1958 Metal Removal—High Temperature Materials Panel.

Chassis Frame Fabricated

(Continued from page 69)

the attachment of chassis parts.

Because of this, GMC employs a massive drilling fixture which also serves to inspect the variety of critical dimensions. Apart from this, the chief function of the fixture is to provide the hole locations for the attachment of the front suspension as well as for mounting the rear air cylinders.

The front suspension for this vehicle incorporates many unique features. As shown, it is a massive but light-weight box section which serves as the front axle bed. Before attachment to the frame, this axle bed is completely assembled with front suspension upper and lower arms, air cylinders, etc., together with the installation of the proper number of shims on each side to give the specified caster and camber for the steering linkage.

INDUSTRY STATISTICS

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

	We	eks Ending	Year t	Date
Make	Jan. 31	Jan. 24	1959	1958
PASSENGER	CAR	PRODUCTION		
Total American Motors Corp	8,484	7,749	34,316	16,311
Chrysler De Soto Dodge Imperial Plymouth	924 530 48 293 130	1,068 853 2,092 285 4,597	5,660 4,419 11,440 1,613 28,328	6,281 3,663 9,515 1,870 38,599
Total Chrysler Corp.	1,925	8,895	51,460	59,928
Edsel Ford Lincoln Mercury	1,400 33,208 758 4,219	1,400 31,858 781 3,861	5,880 134,030 3,558 17,356	1,733 118,261 3,217 12,415
Total Ford Motor Co.	39,585	37,900	160,824	135,626
Buick Cadillac Chevrolet Oldsmobile Pontiac	7,135 3,799 36,170 9,172 9,539	8,497 3,786 36,589 9,790 9,837	35,316 16,553 152,163 40,693 38,905	36,463 13,459 151,818 40,652 32,474
Total General Motors Corp	65,815	68.498	283,630	274,866
Total Studebaker-Packard Corp	3,859	3,848	15,526	2,627*
Checker Cab	170	159	564	237
Total Passenger Cars	119,838	127.050	546,320	489,595
* Includes Packard.				
TRUCK AND	BUS	PRODUCTION		
Chevrolet G. M. C. Diamond T Divco Dodge and Fargo	7,900 1,746 136 78 1,891	8.057 2.156 129 70	34,794 8,116 522 294 7,370	25,587 5,805 479 264 4,615
Ford F. W. D.	7,019	6,712	28,477	23,396

RETAIL CAR SALES BY PRICE GROUPS*

NUMBER OF CARS

	November			
	19	58	19	57
Price Group Under \$2,000 \$2,001 to \$2,500 \$2,501 to \$3,500 Over \$3,500	Units† 5,989 70,511 200,405 27,081 303,986	% of Total 1.97 23.20 65.92 8.91	Units† 827 261,694 103,374 34,992	% of Total .21 64.39 26.45 8.95
		Eleven M	onths	

	1958		1957	
Price Group Under \$2,000 \$2,001 to \$2,500 \$2,501 to \$3,500 Over \$3,500	Units† 47,714 2,275,727 1,127,833 352,376	% of Total 1.25 59.84 29.65 9.26	Units† 24,392 3,353,882 1,494,628 424,500	% of Total .46 63.32 28.21 8.01
Total	3.803.650	100.00	5,297,402	100.00

DOLLAR VOLUME OF SALES

November

	1958		1957	
Price Group Under \$2,000 \$2,001 to \$2,500 \$2,501 to \$3,500 Over \$3,500	Dollars \$11,006,430 167,979,271 540,778,877 120,645,830	% of Total 1.31 19.99 64.34 14.36	Dollars 9 \$1,295,909 594,014,761 297,968,269 156,554,695	of Total .12 56.59 28.38 14.91
Total	\$840,410,408	100.00	\$1,049,833,634	100.00

Eleven Months

	1958		1957		
Price Group Under \$2,000 \$2,001 to \$2,500 \$2,501 to \$3,500 Over \$3,500	Dollars 9 \$85,491,934 5,329,898,972 3,167,145,923 1,560,599,125	% of Total .84 52.55 31.22 15.39	Dollars 9 \$43,313,688 7,568,810,378 4,226,556,252 2,067,507,194	of Total .31 54.43 30.39 14.87	
Total	\$10,143,135,954	100.00	\$13,906,187,512	100.00	

^{*—}Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.

1—New registrations of American made cars only. Does not include imported foreign cars.

61% of Adults Are Licensed Drivers SOURCE: Automobile Manufacturers Association

24,703

24,475

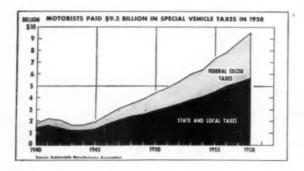
98.315

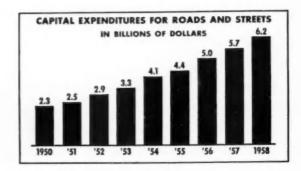
644,810

175

82.289 356

Taxes Take 24 Cents Out of Every Automobile Dollar SOURCE: Automobile Manufacturers Association





Mack White Willys Other Trucks

Total Trucks

Buses

Total Motor Vehicles....

The BUSINESS PULSE

Prospect of a Continuing Uptrend This Year Is Strengthened by the High Momentum Attained by the Economy in the Fourth Quarter of 1958. Gross National Product of \$470 Billion Foreseen for 1959

The new year seems to be off to a good start. Complete figures are not yet available for January, but in general it appears that production and trade registered some further recovery. Business in the bellwether steel industry was particularly buoyant as the year began, featured by a sharp advance in new orders and the highest weekly output levels in a year and a half. And new-car sales did sufficiently well in the early weeks of the year to strengthen the conviction that 1959 will be a substantially better year than 1958.

The economic outlook was not changed in any essential way by the appearance of the President's new budget. The budget's "hold-the-line" philosophy and condition of balance had been anticipated. So too had its denunciation by "liberal" critics as penny-pinching and inadequate.

Reduction in Government Spending?

Nominally, the budget schedules a \$4 billion reduction in spending by the Federal Government in fiscal 1960. But it is premature to assume that such a cut will actually be achieved. The first qualification arises from the fact that, more often than not, initial budget estimates tend to understate the sums eventually spent. And secondly, Congress is apparently in a mood to fashion some programs on a more generous scale than the Administration desires.

Even if the reduction of \$4 billion should be realized, this would not mean a decline by an equal amount in purchases of goods and services by the Federal Government. This is because some of the

This Survey, published for the readers of automotive magazines exclusively in AUTOMO-TIVE INDUSTRIES, has been prepared by the Guaranty Trust Company of New York

biggest prospective savings in the conventional budget accounts involve items that are not in the goods-and-services category. Actually, there is every prospect that Government spending for goods and services will be about as high in fiscal 1960 as in the current fiscal year.

Continuing Prosperity

Underlying the President's budget estimates is the assumption of continuing prosperity during the rest of the calendar year, sufficient to raise Treasury revenue by \$9 billion over that estimated for the current fiscal year. Gross national product in the calendar year 1959 is projected by Treasury analysts at \$470 billion, which would be about 8 per cent greater than in 1958. By the final quarter of 1959, it is assumed, GNP will be running at an annual rate of roughly \$480 billion. This set of expectations, which is about in line with majority thinking among economists, represents a substantial advance, though not so large as the gain which occurred in the boom

The prospect of a continuing uptrend in 1959 is certainly strengthened by the high degree of momentum attained by the economy in the final quarter of 1958. Preliminary estimates by the Council of Economic Advisers put GNP at a seasonally adjusted annual rate of \$453 billion in that period, \$14 billion higher than in the third quarter. All major sectors, except the international, made some contribution to the rise.

Consumer Buying Strong

Personal consumption expenditures accounted for \$5 billion, or about a third of the advance, featured by an encouraging increase in purchases of durable goods. Consumer buying was especially strong in December, with retail sales reaching a new all-time monthly high of \$17.5 billion, seasonally adjusted, 3 per cent greater than in November and almost 4 per cent higher than in December, 1957.

Inventory developments also accounted for about \$5 billion of the rise, as liquidation—which in the third quarter had run at an annual rate of \$5 billion—came to a halt. A shift to accumulation now seems probable.

Residential Construction

Outlays on residential construction were higher by more than \$2 billion, or about a tenth, at an annual rate. And the rather amazing and partially unanticipated strength in this sector seems certain to spill over into the new year, since housing starts and contract awards were still in a rising trend as 1958 came to an end. In December, the seasonally adjusted annual rate of private nonfarm housing starts rose for the tenth consecutive month to \$1.4 billion, more than 50 per cent above the recession low

(Turn to page 96, please)

News of the MACHINERY INDUSTRIES

- By Charles A. Weinert -

December Machine Tool Orders Hit 1958 Peak With Volume of Almost \$43 Million. Net New Orders for Full Year Totaled \$373.35 Million, and Shipments \$518.8 Million

December Orders Highest in Year

Net new order bookings for machine tools during the month of December substantially exceeded, in volume, any other 1958 month.

Cutting-type machine tool orders amounted to \$30.15 million—an increase of 35 per cent over November's \$22.25 million, and 62 per cent over December, 1957; while forming-type machine tool orders in December had a net value of \$12.8 million—51 per cent above the preceding month's \$8.45 million. Orders for both types, combined, totaled \$42.95 million—up 40 per cent from November.

With the December figures still

preliminary, the Year 1958 total net orders are:

	Cutting Forming		million
1958	Total .	 \$373.35	н

Shipments of cutting-type machine tools in December were valued at \$33.05 million, and of forming-type machine tools \$9.8 million; for a total of \$42.85 million—up 27 per cent above November's \$33.65 million. On shipments, the 1958 totals now stand:

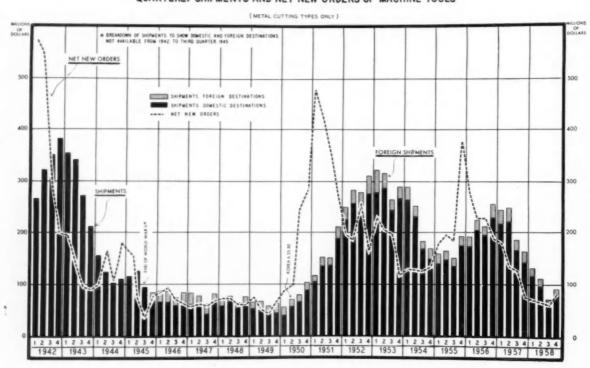
The backlogs of orders on hand as of January 1, 1959 are currently estimated at 3.1 months for cutting-type and 3.5 months for forming-type machines, or 3.2 months combined.

In the accompanying chart are shown, for comparative purposes, the volumes of metal-cutting-type machine tools ordered and shipped, by quarters, for the period 1942 to the close of 1958.

The above operating results of the machine tool industry were compiled by the National Machine Tool Builders' Association. In transmitting these data, Ludlow King, executive vice-president of the Association, commented, in part, as follows:

The 4th quarter of 1958 "is the first quarter the total machine tool (Turn to page 109, please)

QUARTERLY SHIPMENTS AND NET NEW ORDERS OF MACHINE TOOLS



AIRBRIEFS

By David A. Partridge

Bendix Airborne Laboratory To Investigate Global Weather

Latest Bendix developments in scientific sensing and electronic equipment will be tested during a project carried out for the USAF which will undertake to unlock the secrets of our global weather.

Data from ground level to 150,-000 ft will be constantly collected, analyzed and transmitted to the ground from a Boeing 707 equipped as a flying laboratory. The airplane will operate at altitudes up to 55,000 ft. Weather below the plane will be sampled by use of parachuted "dropsondes"; weather above will be checked with rockets carrying instrument packages to the upper atmosphere. All data will be recorded on magnetic tape and then transferred to a general purpose digital computer for correction, computation and correlation.

Two kinds of radar will be used for measuring cloud formations and storms. A "C" band will permit detection of storms as distant as 150 miles. A "K" band with antennas will measure the bases and tops of cloud layers from the ground to 100,000 ft.

Aircraft and Parts Industry Wages

Average hourly earnings in the aircraft and parts industry during October, 1958, was \$2.56, a one-cent increase over the previous month. This represents a \$1-an-hour increase over the average hourly wage reported in 1949, and a 13-cent increase over the average wage reported at the beginning of 1958.

Employment dropped slightly in October to 762,500 workers from 763,700 employees in the previous month, according to the Bureau of Labor Statistics.

Brief Airbriefs

Scheduled to fly soon, a research aircraft is designed to withstand temperatures ranging from 1000 to -300 F-Armament carried by a modern fighter-bomber equals the destructive power of an entire World War II bomber formation-Nuclear powered military aircraft will, in some cases, be capable of such lengthy missions that two crews may have to be assigned to an individual airplane - To become airborne, a B-52 jet bomber must roll down the runway at nearly 250 mph - Delivery of a cluster of rocket engines capable of thrust in excess of one million pounds is expected during 1959 and development is started on a single chamber rocket engine that will product 11/2 million pounds of thrust.

Civil Aircraft Shipments Drop

Shipments of complete civilian aircraft in November, 1958, amounted to 531 planes valued at \$34.9 million which compares with 628 planes valued at \$49.3 million shipped during October, according to the Department of Commerce.

Unfilled orders for civilian planes of 3000 lb airframe weight and over amounted to 635 at the end of November, 17 per cent under the backlog of one year ago.

Air Freight Information Bureau

A central source of information for shippers using air freight in the New York area has been established by the Air Freight Information Bureau of New York. Information concerning all airline schedules, rates, documentary requirements and all other factors of importance to shippers and recipients of merchandise through air freight can be obtained from the bureau either by telephone or correspondence.

F-105 Makes Record Flight

A Republic F-105 Thunderchief jet fighter-bomber flew non-stop from Eielson AFB, Alaska to Elgin AFB, Valparaiso, Florida, in five hours and 27 minutes recently. The aircraft was refueled twice during the 3850 mile trip.

Now being introduced into the inventory of the Tactical Air Command, the F-105 provides the organization with a new long range nuclear capability. The plane is 63 ft long, has a wing span of 34 ft and is equipped with a Pratt & Whitney J-75 engine with 15,000 lb thrust without the afterburner.

Detroit Harvester Head Sees Power Mower Sales Doubling

Sales of power mowers will double during the next decade, topping seven million units by 1969, according to J. Thomas Smith, president of Detroit Harvester Co.

At the same time, Smith believes, the number of companies building power mowers will decrease as design and service become more important to the industry. Saturation is low, with only 13 million homes equipped with power lawn mowers.

Smith made his predictions at the 40th anniversary of Moto-Mower, Inc., subsidiary of Detroit Harvester.

THE earthmoving equipment industry is facing increasingly strong competition from European manufacturers in world markets, reports the director of marketing of a leading company after spending many months abroad studying the market. Many American companies have set up foreign manufacturing facilities to take advantage of the lower cost in European countries and in Australia. British equipment, said the marketing man, is strongly established in world markets, particularly throughout the Empire. German equipment is beginning to win acceptance. Italian construction machinery, while sometimes not available in the larger capacity ranges, has a following.

The big obstacle that American manufacturers must overcome is the price differential. The American wage scale is about eight times that of most European countries, and, even with tremendous investments of capital for automatic production, the USA product finishes about 25 to 30 per cent higher in price. "Subsidized sales," in which some arm of the United States Government makes a "loan" to a foreign government and the foreign government then uses some of the money to buy American-made goods, have kept sales going, along with a genuine respect for the quality of American-made machinery. Where the equipment is made in foreign plants to American specifications, however, there is no

Trends in the CONSTRUCTION EQUIPMENT Ity difference, real or imagi-

quality difference, real or imaginary, to put forward.

In some countries, notably Italy, construction projects have not been of such size as to require large-size equipment, and construction equipment manufacturers have not produced such units. Britain has only recently begun production of equipment of large capacity, but now produces machines comparable to the USA's largest.

New Motor Grader

Allis-Chalmers Mfg. Co. has announced a new motor grader for its construction machinery line, rounding out the line of these units made by the company. The new One Forty Five model is an 80 hp, 21,540-lb machine, while the earlier models were of 58 hp for the Model D, and 120 hp for the Model Forty Five.

The new model is powered by an Allis-Chalmers 4-cylinder Diesel engine that develops 80 hp at 1800 rpm. It has six forward speeds ranging up to 20.3 mph, and three reverse speeds ranging to 7 mph. High clearance under the front axle and moldboard

By Kenneth Rose

circle for handling big windrows by the Roll-Away Moldboard are Allis-Chalmers features. The 12ft moldboard with 90-deg maximum bank cutting capability, wide shoulder reach outside the front wheels, and power actuated fully reversible circle turn are high production features. Power operated leaning front wheels, with 6500 lb of weight on the front axle, provide front-end stability. Steering wheel and operator's seat are adjustable, and mechanical controls, with A-C toggle action, are conveniently located.

Special equipment items for the One Forty Five are power steering, hydraulic shiftable moldboard, heavy duty scarifier, V-type snow plow and wing, and a range of tire options.

Tabulations of shipments of selected construction machinery for the first and second quarter of 1958 and the summary for 1957, have been released by the Commerce Department's Census Bureau, Second quarter totals of \$285 millions showed a 60 per cent increase over the \$178 millions reported for the

(Turn to page 94, please)



Allis-Chalmers new 80 hp Model One Forty Five motor grader powered by an Allis-Chalmers tour-cylinder Diesel engine.

Shipments of Construction Equipment During First Half of 1958

	First Quarter	Second Quarter
Track-type tractors	\$57 million	\$91 million
Tractor-shovel loaders	30 million	47 million
Motor graders and		
light maintainers	18 million	
Ditchers, trenchers, scrapers, rollers,		
compactors	4000	30 million
Contractors' off-highway wheel		
tractors	A	28 million



Now you can get highest capacity at lowest cost with Torrington Needle Rollers

A hardened shaft, a hardened housing, and precision Torrington Needle Rollers provide the most economical, highest capacity antifriction assembly you can obtain.

Six roller end shapes permit design flexibility whether the requirement be maximum effective roller length, proper fillet clearances or greater lip retainment. Torrington Needle Rollers are available in a complete line meeting SAE and AFBMA specifications. Torrington standards for material, heat treat, tolerance and finish of Needle Rollers are the highest in the industry.

Operating results with Needle Rollers depend on careful design of mating parts. Torrington's Engineering Department, with extensive experience in Needle Roller application, will be glad to give you technical advice on your needs. The Torrington Company, Torrington, Conn. - and South Bend 21, Ind.

TORRINGTON BEARINGS

District Offices and Distributors in Principal Cities of United States and Canada



ed), Torrington Nee-dle Rollers allow largest possible shaft diameters.



Carefully hardened, ground and lapped high carbon chrome steel makes each Torrington Needle Roller a precision part for long life



Close tolerances are assured by stringent quality controls. Standard OD tolerance is .002°, but Torrington Needle Rollers can be supplied with tolerance of .0005°. Tolerance on length depends on end shape.



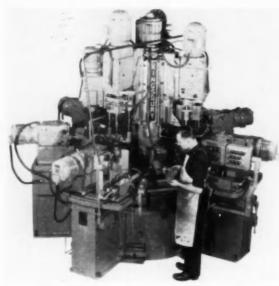
Fine finish reduces friction to a minimum. Torrington Needle Rollers are usually polished to 4-6 rms, but finishes as fine as 1-3 are available on special order.

MEEDLE . SPHERICAL ROLLER . TAPERED ROLLER . CYLINDRICAL ROLLER . BALL . MEEDLE ROLLERS . THRUST



PRODUCTION EQUIPMENT

FOR ADDITIONAL INFORMATION, please use reply card at back of issue



Kingsbury multi-unit automatic. On the center volumn are four vertical units that drill seven holes in the top face and ream of them. four knees attached to the base are six horizontal units for two holes that are close to gether on the end of the work. These units drill each hole in two steps to keep within the allotted time cycle and then ream. Bushings guide all tools except the secand drills on these two holes.

Multi-Unit Automatic Performs 17 Operations

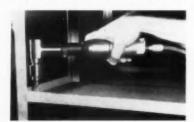
THIS Kingsbury multi-unit automatic with center column performs 17 operations on valve bodies for automatic transmissions. Ten units drill and ream at a gross rate of 320 parts per hour. A 43 in. index table holds seven work fixtures with power

clamping and automatic unclamping. The operator loads each part in the fixture with the joint face down. An air cylinder at the left depresses a ram that actuates the clamping arms. Kingsbury Machine Tool Co.

Circle 35 on postcard for more data

Angle Head Drills

Two angle head pneumatic drills have been designed for speeding up production drilling in corners, crevices and other hard-to-reach locations. These special tools have application in aircraft, missile, automotive and industrial fields. Both are



Airetool Model 400-RA angle drill

lightweight and have a powerful pneumatic motor.

They are equipped with a lever or lock button throttle control and a 3-jawed chuck and are furnished in 600, 1100, 2200, 3000 and 5000 rpm models. Airetool Mfg. Co.

Circle 36 on postcard for more data

Deburring, Finishing

THE Mecha-Finish Corp. has developed Mechamatic Unit No. MM-4-8, which is designed for deburring and finishing a variety of parts. It can handle paired components which must be deburred and remain together, such as connecting rods and caps.

The parts are mounted on spindle fixtures, air operated, which are submerged, while rotating, in a fluid abrasive mass which simulates a form fitting grinding wheel, regardless of the shape of the piece part and travels at a rate of 300 to 600 sfm. At a one minute time cycle the machine will produce 480 pieces per hour.

Circle 37 on postcard for more data

Paint Handling Pump

This air operated, portable paint handling pump named the Pogo 5 has a 2 to 1 delivery ratio and is designed to fit into any standard 5 gallon pail.

The air motor and pump sections are completely separated, thus eliminating the possibility of paint entering the air motor or other critical part. A fluid pressure gage and pressure adjustment control assure an even, regulated flow of paint to the spray gun.

Supplying up to a gallon of paint per minute, the pump requires only



Binks Pago 5 paint handling pump

3 to 6 cfm of air for constant operation. To facilitate use with a pail, the pump outfit includes a cover assembly with clamps for attaching. An air driven agitator and atomizing air control may also be installed with the pump. Binks Mfg. Co.

Circle 38 on postcard for more data



Sealed Power 3-piece stainless steel oil rings maintain desired oil control longer for two reasons: new abutment design (see enlargement); and new material (stainless steel).

Above is cut-away view of the stainless steel oil ring in a piston groove. The new circumferential end abutment design assures perfect tension and better oil control. The ring *does not* depend on the bottom of the groove for pressure . . . is not affected by variations in piston groove depth.

Because stainless steel maintains original, built-in tension and because of the flexibility and independent action of the end abutment design, it takes and retains cylinder shape.

OTHER KEY FEATURES:

- · Stops oil consumption
- Stops smoking even under high vacuum operation
- · Side-sealing
- · Quick seating
- · Chrome-plated for long life
- · Easy to install



oth.

original, built-in
ty and independsign, it takes and

SS-50U

U. S. Patent No. 2,789,872

SEALED POWER CORPORATION, MUSKEGON, MICHIGAN . ST. JOHNS, MICHIGAN . ROCHESTER, INDIANA . STRATFORD, ONTARIO DETROIT OFFICE . 7-236 GENERAL MOTORS BUILDING . PHONE TRINITY 1-3440

Sealed Power Piston Rings

PISTONS CYLINDER SLEEVES

Leading Manufacturer of Automotive and Industrial Piston Rings Since 1911

Largest Producers of Sealing Rings for Automotic Transmissions and Power Steering Units

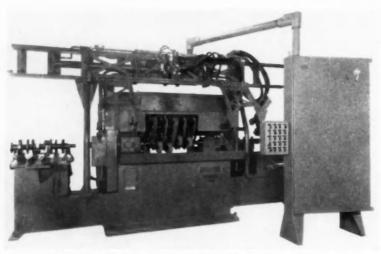
PRODUCTION EQUIPMENT

Mobile Gun Unit for Portable Welding of Parts



This mobile gun unit was developed for general purpose portable spot welding of parts. It features a light weight welded steel cart for ease in moving the unit from one weld position to another. The welding transformer, heat regulator, electronic controls, air controls, air valve and flexible cables with air operated gun, are all mounted on the cart. (The Federal And Welder Co.)

Circle 39 on postcard for more data



Foote-Burt Schraner Model SFB automatic crankshaft machine has a 15 in. swing

Unit for Lapping, Fillet Rolling, or Roll Burnishing

M ODEL SFB is a completely automatic machine for lapping or roll burnishing bearing surfaces on crankshafts and for fillet rolling stress-concentration points at diameter changes. Attachments provide for lapping thrust surfaces if desired. All lapping operations are performed by coated-abrasive belts.

The unit is equipped with a hydraulically operated, automatic loading and unloading device to equip the machine for use with integrated production lines. Crankshafts feed to the loading station from a conveyor. The loading and unloading stations are integral. At the loading station, the crankshaft is positioned both axially and radially. The transfer arms pick up the positioned crankshaft and the one in the machine, swing both outward, and then move past the front of the machine, bringing the new crankshaft in line with

the machine and the finished crankshaft in line with the unloading station. The arms then swing inward, positioning the new crankshaft between the head and tailstock and depositing the finished one on the unloading station, where it is passed on to a conveyor. The Foote-Burt Co.

Circle 40 on postcard for more data

Air-Power Staplers

AIR return and high-speed piston are combined in the Paslode Model PR air-power staplers.

Jet driven air return delivers positive high speed action and extends



Paslade air-powered stapler

tool life. A nylon piston drives the staples without recoil. PR Staplers take Paslode wide and narrow crown staples in leg lengths from 3/16 to 3/4 in. Paslode Co.

Circle 41 on postcard for more data

Stock Feed Unit

Hand-fed punch press jobs can be converted to safe, fast automatic feeding with the Renco-Aire portable, air-operated stock feed. Incorporating the patented Micro Valve control, the unit can be mounted in minutes without links or rods.

Four standard sizes are available for use with almost any hand-fed punch press, and can be shifted from one machine to another as job requirements change.

The press feed is entirely air operated. No electrical connections are required. Cleveland Pneumatic Industries, Inc.

Circle 42 on postcard for more data



A Hydraulic Valve Lifter Has <u>How Many</u> Sides?

You're right—the inside and the outside. Each is as important as the other—and each has received equal consideration and study from Eaton engineers in developing lifters that will meet the exacting requirements imposed by current engine designs. INSIDES that will continue to operate under difficult sludge and varnish conditions; OUTSIDES that are compatible with today's valve-gear load, speed, and lubrication problems.

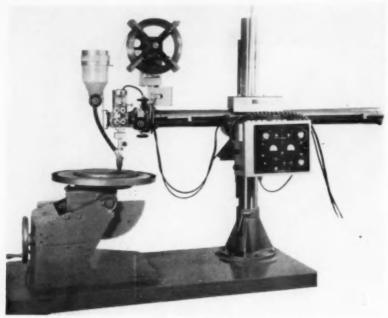
Eaton pioneered the first Zero-Lash Hydraulic Lifters back in 1933. Since that time our engineering laboratories and experimental departments have worked continuously to solve the problems inherent in each new engine design—consequently Eaton lifters deliver long, dependable service.

The benefit of Eaton's many years of experience with hydraulic lifters is at your disposal. Call on us.



EATON

MANUFACTURING COMPANY
9771 FRENCH ROAD • DETROIT 13, MICHIGAN



Miami flexible manipulator for automatic welding has infinite travel speeds

Automatic Welding Fixture

A FLEXIBLE manipulator for automatic welding, consisting of a vertical mast and horizontal boom mounted on a base, either pedestal or cylindrical type, is being offered by Miami Specialties Co.

The boom is made of tubular steel with machined, steel guideways and

rack gear. It has infinite travel speeds from 10 to 150 ipm and is powered by a ¼ hp, 110 v dc motor. Maximum clearance of the boom is 42 in. and the effective weld length is 42 in. Limit switches protect against overtravel.

Circle 43 on postcard for more data

Pot Crucible Furnace

A por crucible furnace has been designed for heavy and continuous duty at all heat levels up to 2000 F. The furnace chamber is 8 in. in diameter by 9 in. deep. Alloy pot dimensions are 6 in. ID by 10½ in. deep, while the atmosphere retort has a working area of 6 in. ID by 8¼ in. deep. The furnace is supplied as a complete unit with transformer, heating element, contactor, thermocouple and chamber cover. Lindberg Engineering Co.

Circle 44 on postcard for more data

Riveting Machine

M odel. 95DP riveting machine maintains trouble-free feed and control of long rivets and provides maximum work clearance. With a 10 in. throat, blade hopper and a choice of 4¼ or 513/16 in. stroke, the machine will automatically feed and set semi-

tubular and full tubular rivets up to 0.260 in, body diameter and 2% in, length.

Its standard center-hung clamping type jaws are equipped with rigid arms and secondary leaf springs to control and hold the rivet securely. Tubular Rivet and Stud Co.

Circle 45 on postcard for more data

Grinding Discs

Spittfire aluminum oxide grinding discs feature fully reinforced grinding edges and a special built-in shape control which eliminates limpness and disintegration due to excessive grit loss.

The discs are available in three models for a wide range of grinding and finishing operations. Their uses include light gage metal sanding and polishing, light and heavy weld and braze removal, and high speed finishing. Abrasive Products, Inc.

Circle 46 on postcard for more data

Thread Rolling Machine

LANHYROL thread rolling machines have been developed to handle double end studs up to 13¼ in. in length. Through extended spindles, the machines will produce these studs at rates of 102—% to 9/16 in. and 80—% in. per minute.

The operation is performed by the continuous rolling method whereby the parts are automatically fed into the machines from an inclined magazine. They are held and carried into rolling position by an indexing work-rest cage.

Thread roll dies are of the segmental type operating at a fixed center distance and held hydraulically. Through their design, two parts are rolled per die revolution. Upon completion of the threading operation, the parts drop into conveyors and are carried out the front of the machines. Landis Machine Co.

Circle 47 on postcard for more data

Servo-Controlled Press

Design features of this H-P-M servo-controlled C-press provide absolute control of all press actions without unnecessary and space taking linkages. At the top of the stroke the valve is in the closed position. Then the operator depresses the lever



H-P-M servo-controlled C-press

and the spiral cam connected to the ram turns fast the thread of the valve spool actuator.

This manually operated press is reported to be especially suited to straightening operations, as the operator has complete control of ram speed, travel, distance and tonnage imposed on the work. Hydraulic Press Mfg. Co., Div. of Kochring Co.

Circle 48 on postcard for more data



PRODUCTION FACILITIES

Burton Springs are produced under the most rigid standards of quality, utilizing modern equipment and scientifically controlled methods.

LEADING TRUCK MANUFACTURERS

. . . Mack, White, Dodge, Diamond T, Trailmobile, Lufkin, Dart, Nabors, Autocar and others . . . have long specified Burton Leaf or Coil Springs as original equipment.

best quality—dependable service life—

Whatever *your* application, you can be sure of the uniform high quality and proven long life of BURTON Engineered Springs. Keyed to the ever-changing needs of the industry, BURTON engineering combines the time-tested advantages of steel springs with the newest developments in their design and manufacture to assure the finest suspension for trucks, buses, trailers, motor cars or off-highway equipment.

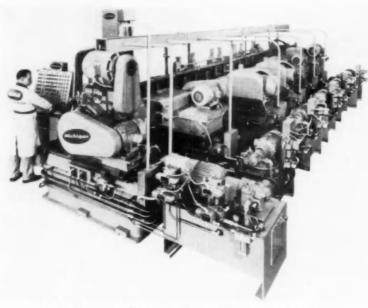


AUTO SPRING CORP.

WESTERN AVENUE AT FORTY-EIGHTH STREET

CHICAGO 32, ILLINOIS

PRODUCTION EQUIPMENT



Michigan fully automated bearing cap production unit produces 225 caps per hour

Fully Automated Bearing Cap Production Machine

PICTURED is a fully automated, 19 station transfer machine designed to produce bearing caps. From a single, one-piece casting, it makes five finished bearing caps and handles 75 castings per hour at 100 percent efficiency.

The horizontal and vertical inline transfer unit is sectionalized and is designed to handle future model changes. Each working station is equipped for individual cycling.

It is built of welded-steel, and castings are transferred by a hydraulically actuated, swinging bar type transfer mechanism. Michigan Drill Head Co.

Circle 49 on postcard for more data

Reutlinger electrodynamic balancing machine has accuracy of 0.00001 in.

Electrodynamic Balancing Machine

Reutlinger electrodynamic balancing machines of the GW series

are designed to balance workpieces of from 1 to 600 lb, while the WM

series will handle several thousand pounds. They are for production use and have hydraulic belt lifters and finger tip controls. In continuous production the time required for locating unbalance is generally less than 25 seconds.

Accuracy is less than 0.00001 in. final concentricity of the balanced workpiece, and the machines have speeds up to 30,000 rpm. Wharton Unitools.

Circle 50 on postcard for more data

Metal Cutting Lathe

The variable speed drive of a Delta 10-in. metal cutting lathe gives the operator all the advantages of variable speed from 50 to 1500 rpm plus the high torque transmitting power of matched v-belts in the final drive to the spindle.

The % in. collet capacity is obtained by using a 4-C style collet with a 15/16 in. hole through the spindle. Rockwell Mfg. Co., Delta Power Tool

Circle 51 on postcard for more data

Hand Cutting Torches

K Nown as the Airco 2000 Series, a line of injection-type hand cutting torches designed for use with propane and natural gas, features an "ease-on" oxygen valve which allows smooth and gradual oxygen flow.

The torch head is a machined silicon bronze forging and for rigidity and strength the brass gas tubes are in a triangular arrangement.

Mixer housing is a machined brass forging which is fed by two short tubes, one for fuel and one for preheat oxygen. The rear of the forging and the inlet connections will accommodate ¼, 5/16 or % in. hose. Air Reduction Co., Inc.

Circle 52 on postcard for more data

Screw Driver-Nut Runner

Automatic starting and stopping is a feature incorporated into the "Clecomatic," a screw driver-nut runner designed by Cleco Air Tools.

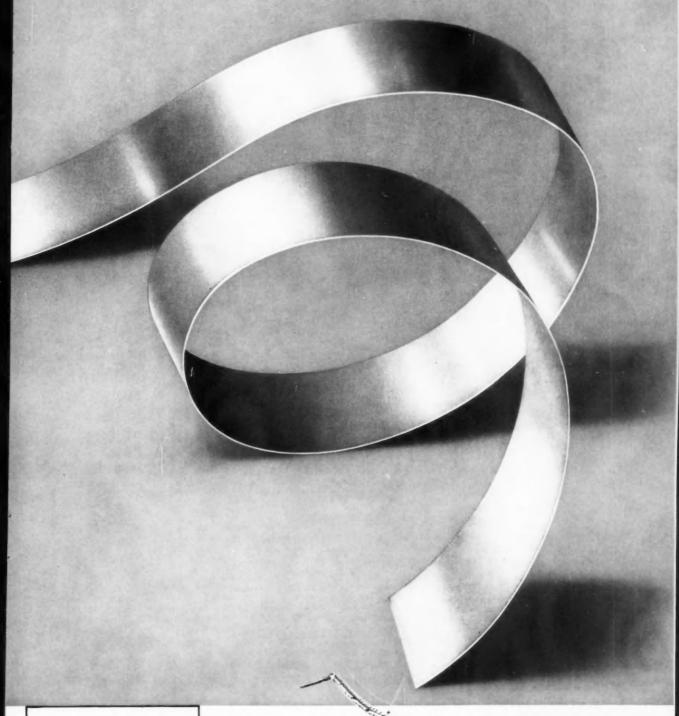
A mechanism automatically starts the air motor, then shuts it off automatically and instantly when the screw or nut has been tightened to torque specifications. The motor operates only during actual rundown.

Circle 53 on postcard for more data

stainless strip - as you like it

Are your requirements for quality and finish in stainless strip being met? As Crucible makes it, it's rolled to your precise specifications—and produced with a finish that is truly lustrous. Not only that, Crucible ensures uniform metal-

lurgical quality by methodically checking each heat—and makes certain of uniform gauge with electronic measuring controls on the most modern rolling equipment. Next time you need stainless, consider Crucible—a major producer of stainless in all gauges down to .010" and in all widths. Write to Crucible Steel Company of America, Dept. S115, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.



CRUCIBLE

STEEL COMPANY OF AMERICA

Canadian Distributor - Railway & Power Engineering Corp., Ltd.

FASTENING SPECIALTIES BY National

Get more dependable holding power for better product assembly with these

National SPECIALTY FASTENERS!





Lok-Thred® Bolts, Studs, Screws—Seal and lock against involuntary loosening . . . Lok-Thred re-forms the metal of the receiving thread under high compressive stresses into intimate contact with itself, eliminating all voids. Yet, it's fully re-usable. Requires no selective fits. Can be used with ordinary tools. Available in all sizes of bolts, studs, screws . . . No. 6 or larger.

Welding Fasteners and Weldnuts-Provide trouble-free assembly of fabricated metal parts... Use National welding fasteners when primary fasteners must be cleanly welded into exact position. National's complete line of projection welding screws and nuts is available in stock sizes, for optimum welds in materials .030 to 14" thick. We will develop special designs for you.





Spin-Lock® Fasteners—Give you strength at low cost, with self-locking, ratchet-tooth action . . . Spin-Lock machine and tapping screws have angled teeth to permit fast, easy tightening. They require about 20% greater torque to loosen. Available in pan, truss, flat and hex heads; slotted or Phillips recessed heads; No. 4 to $^3\,\mathrm{s''}$ diameters, lengths from twice diameter and up.

Flex-Head® Locking Screws—Self-locking, highly resistant to fatigue, shock, impact... Tight locking results from flexing of the head and axial spring tension produced when fully torqued against a rigid seat. Flex-Head screws are identical in dimension, and interchangeable with standard machine screws. Made of 1022 steel and heat-treated for top strength.





Thread Cutting Screws—For joining metals or plastics without tapping ... Use wherever it is desirable to remove rather than displace thread material. Four types: 1, 23, 25, and F cover most applications. Phillips or slotted heads, all styles, all sizes. Also type A and B tapping screws for fastening light sheet steel or light gauges of other metals.

Tuff-Tite® Cushioned Fasteners-Seal openings, eliminate vibration noises, absorb shock ... Pre-assembled neoprene washers also prevent finish marring! Available as tapping screws, thread cutting screws, machine screws, roofing bolts, stove bolts, or wood screws; with Phillips or slotted heads; pan, round, truss or hex head styles.





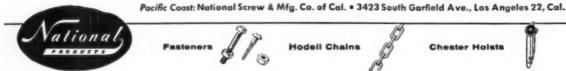
Lock Nuts-Three types, to meet every requirement ... 1. Huglock, for locking withseating and under adverse conditions. 2. Marsden, free-running until seated . . . for minimum-cost locking. 3. Drake, a two-piece design for use under severe stresses, shock, vibration. All types are all-metal, fully re-usable without loss of positive locking action.

Place® Bolts—Self-locking...resist impact, shock and fatigue failure by controlled spring action of reinforced, diaphragm head... Place bolts resist involuntary loosening when rigidly seated. Typical uses: connecting rod bolts, main bearing cap screws, flywheel bolts. Available in high carbon or alloy steel, in a wide range of sizes.

Save yourself time and trouble in searching for the right fastener. Make National your one source for standards, specialties and special designs. Our standard line includes all types and sizes . . . nuts, cap and set screws, machine bolts, carriage, step and elevator bolts, plow bolts; Phillips recessed head, or slotted, Sems, machine screws, wood screws; stove bolts, pipe plugs, cotter pins and rivets.

National can supply any nonstandard fastener, or design and produce specials for you. Write for National's Special Products booklet, or for information on the fastening specialty that interests you.

THE NATIONAL SCREW & MFG. CO. • CLEVELAND 4, OHIO



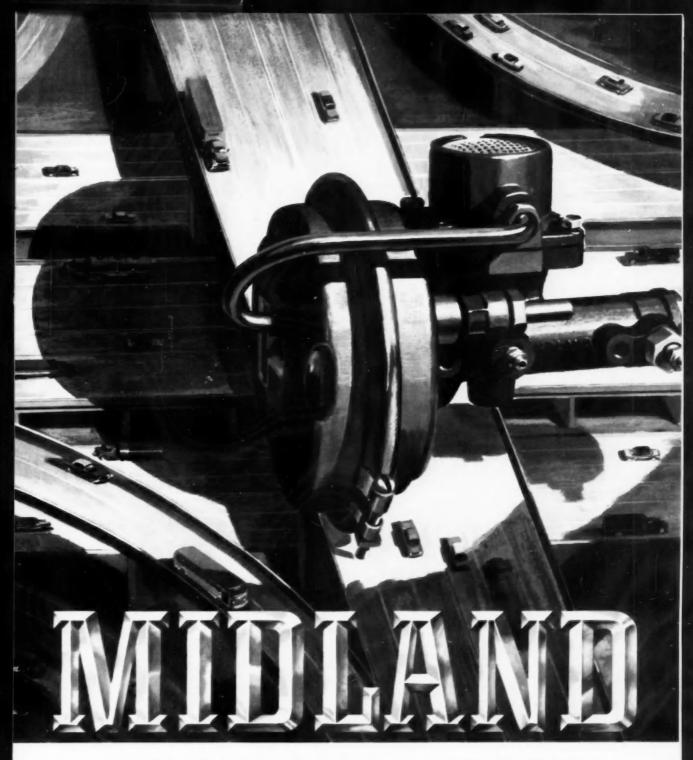


Hodell Chains



Chester Hoists





MIDLAND POWER BRAKE - Safety for a Nation on Wheels

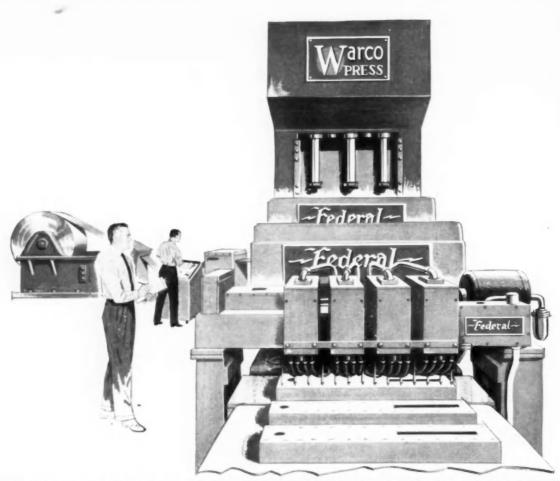
Midland products include:

Air brakes for the truck and trailer industry Vacuum power brakes for the automotive industry Equipment for the Transit industry Control devices for the construction industry Midland Welding Nuts for assembling metal parts Write for detailed information



Owosso Division • Owosso, Michigan
ONE OF THE "400" LARGEST AMERICAN CORPORATIONS





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From Material to Product in ONE PACKAGE

Need help to reduce your manufacturing costs and raise your production? Why not check Federal/Warco Packaged Production Lines — automated production from coil strip or sheet blanks to finished product.

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Federal pioneered and are leading designers and builders of packaged lines. Talk with a Federal representative when next you're planning production welding or press equipment.

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PACKAGED PRODUCTION LINES

THE FEDERAL MACHINE AND WELDER COMPANY - WARREN, OHIO

AFFILIATED WITH BERKELEY-DAVIS, INC., DANVILLE, ILLINOIS, MANUFACTURERS OF AUTOMATIC ARC WELDING EQUIPMENT.

HEW PRODUCTS AUTOMOTIVE - AVIATION

FOR ADDITIONAL INFORMATION, please use reply card at back of issue -

Belt-Driven Wheelheads

Grinding small holes at precise surface speeds without expensive high frequency generating equipment is possible with this belt-driven wheelhead.

The interchangeable cartridge type Heald wheelhead develops spindle speeds of 45,000 to 100,000 rpm for grinding small diameter holes where surface speed of the grinding wheel is critical.

The basic wheelhead consists of a jackshaft and body unit and the spindle cartridge. A spring loaded damped



idler puts constant tension on the spindle drive belt. Its design eliminates vibrations caused by idler bounce. The grinding spindle is oil mist lubricated and the wheelheads are built with a four inch center height as standard. The Heald Machine Ca

Circle 70 on postcard for more data

Hydraulic Servo Valve

Used in hydraulic drives such as airborne antennas and autopilots as a means of converting an electrical signal to a hydraulic signal, a line of hydraulic servo valves has been designed by Westinghouse Electric Corp.

Pressure derivative feedback provides improved dynamic frequency response characteristics, yet gives a high steady-state pressure gain. The units are designed to operate in a 1000 psi servo system.

Circle 71 on postcard for more data

Clamping System

Hi-Lo Products Co. is offering a low-cost starter set of machine tool clamping devices. The starter set contains all the parts needed to make up a clamp to suit any clamping range from % to 11 in. The set includes U-clamps in two adjustable ranges, extensions and a gooseneck adapter. Both the bolt and the heelblock assemblies are adjustable.

Circle 72 on postcard for more data

Spring Wire

Superalloy spring wire made of Inconel X has been introduced by National-Standard Co. for aircraft, missiles, electronics, automotive and other high temperature components that operate between 650 and 1000 F. The wire is heat-treatable nickelchromium, iron, titanium material that can be precipitation hardened.

The wire is available annealed from 0.005 to 0.166 in. diameter, in spring temper from 0.005 to 0.180 in. diameter, and in No. 1 temper from 0.005 to 0.230 in. diameter.

Circle 73 on postcard for more data

Piston Accumulator

This piston accumulator is said to assure long seal life with no air or oil leakage.

The unit has a free piston with three "O" ring seals, all of which are active members. Any air or oil trapped between two given seals is automatically discharged to its respective chamber during each piston stroke. The end caps, machined to receive the piston for dashpot action, use the same size "O" ring seals as the pis-



ton, thus requiring only one size of seal to be stored for maintenance.

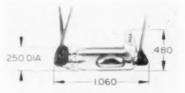
The unit reduces horsepower requirements when service is intermittent, protects system components by reducing surges, compensates for minor leaks in the system, provides a source of emergency power in case of system failure, cuts vibration, and provides a transfer barrier between differing fluids and/or gases. Narda Hydraulics Corp.

Circle 74 on postcard for more data

Sensitive Mercury Switch

A low-angle mercury switch designed to meet precise requirements of vertical gyros, stable platforms and rocket guidance systems has been introduced by Micro Switch, a Div. of Minneapolis-Honeywell Regulator Co.

Designated AS603AI, it weighs 3.8 grams, including three seven inch



Teflon-insulated leads. It features a differential angle of 0.15 degrees maximum and a mass shift of 0.085 grams-centimeter.

Contact arrangement is single-pole, double-throw. Switch is electrically rated for 0.225 amp, 30 vac, 400 cps, for an inductive load.

Circle 75 on postcard for more data

Steel Shaft Collars

A complete line of steel shaft collars, introduced by Jergens Tool Specialty Co., using special socket set screws is available in sizes to fit all shafts ranging from 1/4 to 3 in. OD in 1/16 in. graduations.

Made of black penetrate finish steel, the collars serve a wide range of needs in all phases of industry.

Circle 76 on postcard for more data

Hydraulic Power Unit

GC-2405 hydraulic power units are designed as a dependable fluid power source for tractors, dock leveling devices, tail gate lifts, dump bodies, lift trucks and other types of work loads.

Rotary gear pump capacities of ½ to 4 gpm at 1800 rpm are available. Pressures are up to 2000 psi. John S. Barnes Corp.

Circle 77 on postcard for more data

Centrifugal Clutch

Fairbanks, Morse & Co. has developed a pin-cage centrifugal clutch for rugged use with electric motors and gasoline engines.

Speed of the prime mover and centrifugal force govern the operation of the clutch. Advantages in accelerating high inertia loads include: the engine motor can operate at an efficient speed while the load is being accelerated; free-wheeling in either direction is available when the prime mover is stopped. The clutch is said to be good for stand-by power applications and provides dual drive when applied to a motor or engine.

The pin-cage clutch is available in capacities from 1 to 30 lb-ft, at 1200 to 3600 rpm, with OD of 3, 3-½ and 4-½ in., and with 7/16 to 1 in. diameter bore.

Circle 78 on postcard for more data

Synchronous Machine

The Secsyn brushless generator is a salient pole synchronous machine utilizing a conventional stator but incorporating a unique means of providing excitation to the rotating pole structure.

The rotor is essentially a tube supported by a "spider of spokes" on the shaft. The spokes, extending from the shaft to the North poles, are of magnetic material. The North poles appear as approximate hexagonal areas on the rotor surface and are surrounded by nonmagnetic but electrically conducting material which forms a part of the damper cage. The remainder of the central portion of the rotor tube forms the South pole.

Outer rings at each end of the rotor tube provide a path for the return of flux to the stationary field coils via the homopolar air gaps.

The Secsyn can be operated at any speed up to 100,000 rpm and can be

adapted to perform a wide range of functions: D-c generator, synchronous motor, synchro, a-c generator and constant-speed motor. Jack & Heintz, Inc.

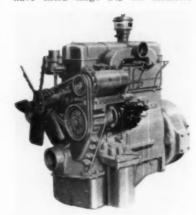
Circle 79 on postcard for more data

Diesel Engines

Designed for application in light trucks, busses, farm and crawler tractors, shovels and cranes, etc., two Diesel engines—the 70 hp J-70 and the 80 hp J-80—are offered by the Cummins Engine Co.

The engines are four cycle, naturally aspirated models of 41% in. by 5 in. bore and stroke with 267 cu-in. piston displacement. The J-80 develops its rated horsepower at 2500 rpm while the J-70 is rated at 2000 rpm.

Each of the engines has five main bearings of 3% in. diameter. They have extra large 2% in. diameter



connecting rod journals, 1½ in. diameter piston pins and five camshaft bearings. They feature easily removable wet type cylinder liners which make "in frame" overhauls practical.

Circle 80 on postcard for more data

Gear-Type Pumps

A line of gear-type pumps has been designed to handle lubricating or hydraulic oils at pressures from 20 to 300 psi and speeds of 1200 to 1800 rpm.

Four capacities of pumps are available in the series for either left or right hand shaft rotation.

Capacity of the pumps in the Q7 series ranges from 38 to 41 gph at 1200 rpm, and from 57 to 62 gph at 1800 rpm. The latter is maximum shaft speed for pumps in the series. Sundstrand Hydraulic Div., Sundstrand Machine Tool Co.

Circle 81 on postcard for more data

Compact Power Unit

This electric-hydraulic power unit is primarily designed as a small compact power unit for use on missiles and rockets.

It is capable of performing in fluid and ambient temperatures of —65 to 275 F when using Mil-H-5606 as the hydraulic fluid. Pump rating is 0.75



gpm at 3000 psig discharge pressure at 10,000 rpm and having a duty cycle of three minutes on and 30 minutes off.

Weight of the pump is 1 lb and when coupled to a 28 v, d-c electric motor total weight is 7 lb, 12 oz. Designed life totals a minimum of 200 hrs and the unit measures 9 13/16 in. long. Lear-Romec Div., Lear, Inc.

Circle 82 on postcard for more data

Fused Teflon Tape

Continental-Diamond Fibre Corp. announces the availability of four grades of skived Tefon tape.

Made by skiving Teflon billets, these tapes feature good electrical properties, resistance to all common chemicals, a low coefficient of friction and a surface to which nothing will stick. The tapes are designed primarily for high temperature and high frequency wire and cable insulation. They may also be used as stock from which gaskets, seals and miscellaneous small parts can be cut.

The tapes range in width from ¼ to 12 in. in ¼ in. increments.

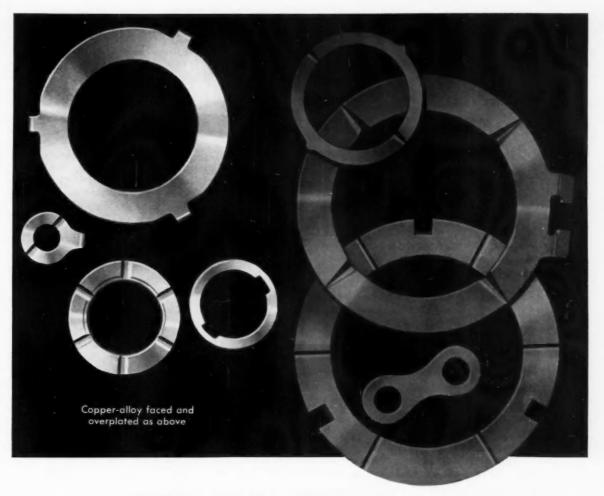
Circle 83 on postcard for more data

Self-Locking Coupling

Standard Pressed Steel Co. has developed a self-locking coupling for hydraulic lines. Adaptable to either flared or flareless methods of tube sealing, the nuts resist loosening under severe vibration, even when not fully seated.

They are unaffected by oils and are usable to 800 F working temperatures in stainless steel form and 550 F in steel.

Circle 84 on postcard for more data



PRECISION THRUST WASHERS

Variety in design and material Uniformity in quality and performance

In solid bronze, or steel faced with lead or tin-base babbitt, or sintered copper-alloy or bronze on one or both faces. They are cold rolled for heavy-duty operation.

Flat, spherical or special shapes, with coined

oil grooves, ball indentations on one or both sides, holes, nibs, lugs or scallops. Up to 5" O.D.

Extensive manufacturing facilities. Quality control. Complete engineering service.

FEDERAL-MOGUL DIVISION

FEDERAL-MOGUL-BOWER BEARINGS, INC., 11037 SHOEMAKER, DETROIT 13, MICHIGAN













A story without an ending!



The Versatility of TAYLOR Vulcanized Fibre

What this material is . . .

Vulcanized fibre is truly one of the wonder materials of all times. It is hard and dense, with excellent physical, mechanical and electrical properties. It is tough and resilient—has high resistance to impact, abrasion, wear, organic solvents, oils and gasoline. It is attractive and light in weight.

What can be done with it . . .

Vulcanized fibre can be machined, turned, stamped and punched. It can be formed, sawed, drilled, planed, milled and chiseled. It can be hammered, shaved, threaded, buffed and sanded. It can be decorated by lacquering, painting, printing and engraving. It can be laminated.

How it can be used . . .

Vulcanized fibre can be used for welders' helmets, golf club face inserts, carrying cases, track and motor insulation, and abrasive discs. It can be used for switch parts, gears, sliding door guides, shuttles, bobbin heads, labels and tags; for facings, table tops, partitions and kitchen utensils. There is no end to the things that can be done with it and the applications for which it is suited.

For more complete information on the forms and grades available, contact TAYLOR FIBRE CO., Norristown 49, Pa.





To keep pace with the increase in automobiles, U.S. spending for roads and streets hit an all-time high of about \$9.5 billion in 1958.

Registrations for 1958 show that there were approximately 57 million cars in use by the end of the year. This includes cars owned by the Government, business and organizations in addition to family-owned vehicles.

California leads with 5,808,837 registrations, followed by New York with 4,272,518, Pennsylvania 3,433,134, Ohio 3,350,063, Texas 3,259,896, Illinois 3,075,578, Michigan 2,823,146, and New Jersey 1,890,340.

Florida has the fastest growing car population with an 11.3 per cent increase from 1956 to 1957.

The hightest ratio of population to registered automobiles is shared by Nevada and California, where one car is registered for every 2.3 persons.

From 1941 to 1957, California had the highest increase of passenger cars in the U.S. with 3,186,454 added registrations during the 15-year period. At the same time, Florida had the highest percentage increase with 266.8 percent.

More than 25 million cars in the U.S. today are five years old or older. Some 2.2 million are of prewar vintage.

The average age of trucks in use today is 6.98 years. A million are 12 or more years old.

A pushbutton system developed by the aircraft industry will load 35,000 lb of cargo in a new turboprop air freighter in 40 seconds. The system works in reverse to yank cargoes from the aircraft at the same speed.

Automotive Applications of Nickel and its Alloys

(Continued from page 60)

Use of this 50,000 min. yield strength permits weight reduction of 20-25 per cent per boom. Type 8630 with 65,000 yield strength is being considered for booms. Booms weigh 2000 to 8000 lb each, adding 12 to 48 lb of nickel per unit. Production of truck-mounted cranes in 1958 may have reached 4000 units and consumed a total of approximately 140,000 lb of nickel.

Two-Wheel Tractors

The amount of nickel alloyed in mechanical components of two-wheel tractors for scrapers and trailer wagons will range from 5 lb in the smaller units to 15 lb in the larger jobs. It is just about impossible to figure the quantity going into plate and structural members, as the use of nickel in plates is widely scattered depending on size, processing details and service requirements. Production of these two-wheel tractors in 1958 may have hit the 5500 mark; figur-

ing an estimated average consumption per unit of 10 lb of nickel, a total of about 55,000 lb of the metal could have been consumed in their output.

The following is a partial listing of applications for nickel steels in these two-wheel tractors: transmission gears, shafts, and pinions; idler, sleeve, cluster, and differential gears; drive axles; differential spider, bevel pinions and ring gears; planetary axles; and worms and bolts. Transmission, differential and axle housings, and wheel hubs are ductile cast iron.

In the scrapers themselves, Ni-Cu steels are used for the frames, bowls, and aprons, while the scraper cutting edge is a Ni-Cr-Moly steel. Other nickel steels, together with T-1 and ductile cast iron, are found in remaining parts. Applications in trailer wagons include sides, end sheets, and bottoms; king pins; axles; and drawbars.

CONCLUSION

Free World nickel production capacity in 1958, it is estimated, was upped to about 525 million lb, 115 million lb in excess of consumption in 1957. Production capacity is estimated at about 550 million lb in 1959, 600 million lb in 1960, and 650 million lb in 1961. This last figure is about 235 million lb more than total Free World consumption for both civilian and defense purposes in 1957. These estimates by International Nickel Co. are based upon Inco's own projects and upon the announced production and expansion plans of other producers.

Thus, the supply of nickel now and in the foreseeable future is ample for everyone's needs. As a matter of fact, in order No. BD-58-92 issued July 2, 1958, the Businesses and Defense Services Administration of the U. S. Dept. of Commerce completely eliminated all specification restrictions on the

use of nickel. These altered conditions should bring about the revival of many former uses of nickel and spur the development of new applications where it is essential or desirable.

As far as the outlook for the future is concerned, the markets for nickel are established on a very broad base. The present uses of nickel represent somewhat of a distillation of applications that have withstood tremendous pressures. Stainless steel is expected to have a steady growth, and electroplating should increase greatly. The special alloys for electronics and instrumentation should certainly enjoy wider fields as technology improves. To be sure, nickel has lost some ground in the automotive industries to competitive alloys. There remains, however, a strong potential for an expansion of traditional uses and the development of new ones to meet more



completeness

Completeness at Southern Screw starts with the placing of your order and continues through the shipment of your screws on free disposable pallets. Whether your screws are supplied from stock or manufactured to your specifications, customers know that Southern Screw's completeness includes the consistent and constant quality and service they have a right to expect. Your fastener requirements really may call for "specials" which are standard in Southern Screw's 1.500.000.000.000-piece stock.

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Circle 150 on Inquiry Card, for more Data



DU is as close to the perfect dry bearing material as you will find today. It is a patented composite material consisting of a steel and porous bronze interlayer impregnated with a lead-filled TFE* fluorocarbon resin.

The compressive strength of DU is approximately 51,000 psi. DU is capable of operating at higher velocities than other dry bearings in many problem liquids and at temperatures from -328° F. to $+536^{\circ}$ F. Thus DU is suitable for many applications ranging from liquid gas pumps and compressors to high temperature oven conveyor systems.

Most important, with DU the designer can quickly and accurately predict bearing life for specific applications. The unique characteristics of DU make possible establishment of curves relating bearing life to any load-speed conditions. These curves and other important design data are included in Bulletin DU-458. Ask your bearing manufacturer, or write to SPECIAL PRODUCTS DEPT., United States Gasket Co., Camden 1, N. J.

U nited S tates G asket *Teflon, DuPont Trademark Fluon, I.C.I. Trademark

GARLOCK



Circle 151 on Inquiry Card, for more Data

rigorous vehicle operating condi-

The field of heat is a really promising one for nickel. It appears to be beneficial to a wide variety of alloys designed for strength and resistance to corrosion at high temperature. Industry is constantly expanding the temperature limit at which machinery operates.

An obvious case in point is the oft-discussed development of the gas turbine for automobiles. Another is the shift from manned aircraft to guided missiles, which will require alloys resistant to much higher skin temperatures than heretofore. The commercial development of atomic energy for peace-time uses augurs well for nickel demand.

Industry is in an era of unprecedented engineering thought and research. In time to come, as scientific research spurs industry on to new accomplishments, the search will be intensified for metals with properties capable of increased special performance. Tougher and stronger alloys will be sought to stand up under extraordinary conditions of service. Nickel will be undoubtedly used to satisfy many of these requirements in the years ahead.

Illustration Credits

Except for the instances noted, all tabular material and photographs used in this article were provided through the courtesy of International Nickel Co., Inc.

Construction Industry Trends

(Continued from page 76)

first quarter. These are broken down in the table.

Total shipments of selected construction machinery for 1957 were valued at \$1,597 million, broken down to \$508 million for track-type tractors and parts, \$312 million for power cranes and shovels, \$166 million for tractor-shovel loaders, \$147 million for contractors' off-highway wheel tractors, \$99 million for ditchers, trenches, scrapers, rollers, and compactors, and \$93 million for motor graders and light maintainers.





This sludge-clogged hydraulic line...looked like this, after cleaning with a Sunvis 700 oil.

With Sunvis 700 oils, you can clean hydraulic systems and keep them clean

Sludge, caused by high temperatures, and by water, dirt, cutting oils, paint, packing, and by many other contaminants, clogs lines and cuts efficiency.

Sunvis* 700 oils keep these contaminants in suspension, and carry them away to the filters, thereby keeping systems clean and preventing costly shutdowns. In fact, many seriously fouled systems can be cleaned and kept clean permanently by a switch to Sunvis 700 oil. A single charge of Sunvis 700 oil can keep even a continuously contaminated system running smoothly for months, often years.

Your Sun man knows Sunvis 700 oils inside

out. He has facts, figures, and case histories that prove their quality...quality that means money in your pocket. Call him in soon. Or write to Dept. AA-2.

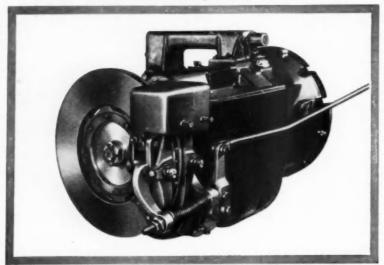
Industrial Products Department

SUN OIL COMPANY, Phila. 3, Pa.



In Canada: Sun Oil Company Limited, Toronto and Montreal

Automotive Equipment is Easier to Sell when equipped with TRU-STOP heavy-duty Brakes



Positive Protection Against Runaway or Parking Accidents

TRU-STOP brakes operate directly on the drive shaft. This means that they are not only excellent parking brakes, but dependable emergency service brakes as well. There's no dangerous self-energizing. TRU-STOP brakes have the surplus capacity for repeated use as an auxiliary to service brakes.

100% Ventilation Minimizes Fading

Brake efficiency depends on ability to dissipate heat rapidly and so prevent fading. TRU-STOP brakes are $100\,\%$ ventilated. Discs are exposed to air even while braking. The TRU-STOP ventilation system circulates air between the disc plates.



Longer Life with Uniform Brake Pressure

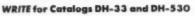
The discs of TRU-STOP brakes are squeezed between the flat surfaces of the shoes. The brake lever operates both the front and rear lever arms simultaneously, and pressure is exerted on the center of each shoe. This puts the entire lining surface in contact, provides for even wear. TRU-STOP brake linings are easy to replace.



FOR POSITIVE PROTECTION...

Specify TRU-STOP BRAKES on

ANY Heavy-Duty Equipment that Requires Braking



Automotive and Aircraft Division

AMERICAN CHAIN & CABLE



AMERICAN CHAIN & CABLE

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THE BUSINESS PULSE

(Continued from page 73)

and very close to the 1954-55 all-time high.

Over-all Governmental purchases rose by almost \$3 billion at an annual rate, as both Federal outlays and State and local spending extended their well-defined rising trends.

Decline in Export Surplus

The only substantial offset in the fourth quarter was an estimated decline of about \$1.5 billion at an annual rate in the nation's export surplus. Although the statistical record for the export and import of goods and services in the last three months of the year is not yet complete, the deterioration here apparently was caused primarily by a decline in exports, on a seasonally adjusted basis. The export outlook remains clouded by uncertainties overhanging economic trends in a number of foreign countries, principally in Europe, and also by the unresolved issue of whether American products are becoming progressively less competitive from a price standpoint in international markets. Developments here clearly bear very close watching.

Apart from this weakness in the international sector, the general picture as 1958 ended was one of diversified strength, with sufficient forward thrust in the economy to assure continuing improvement for some time to come.

BOOKS ...

BRAZING MANUAL, prepared by Committee on Brazing and Soldering, American Welding Society, published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. Price, \$4,75. Full up-to-the-minute details of all brazing processes used in the automotive, aircraft, refrigeration, electronics and other mass-production metal industries are contained in this valuable manual. Experts provide all the practical information needed to answer every type of brazing problem. Full chapters describe the principles, equipment and procedures involved in all eight brazing processes; every operation from precleaning and surface preparation to postbraze cleaning and inspection; and the techniques of brazing aluminum, magnesium, copper, steels, iron, nickel, and many other metals.

TRO-STOP





YOU START BETTER WITH BENDIX STARTER DRIVES

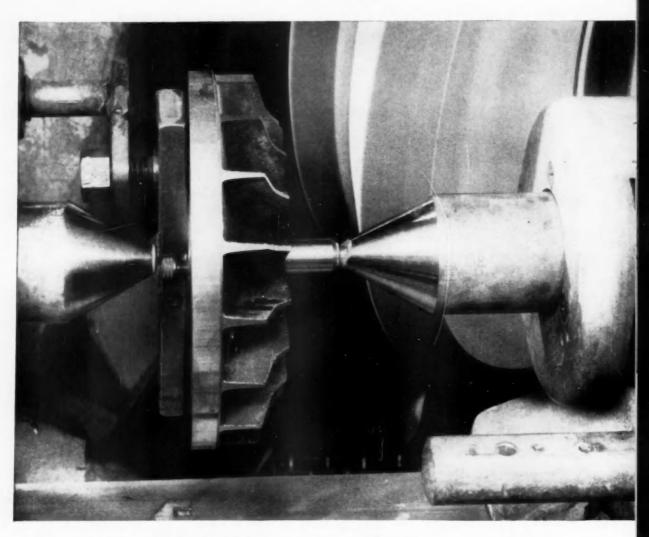
For nearly fifty years—and in well over 125,000,000 installations—Bendix* Starter Drives have become the accepted standard for automotive vehicles. Not so well known perhaps—but equally important—is the fact that these units are also first choice for aircraft, locomotives, earth movers, inboard and outboard marine engines. In short, whatever the type of internal-combustion engine, you can start it better with a Bendix Drive.

**acc. U. S. PAT. OFF.

Bendix-Elmira

ECLIPSE MACHINE DIVISION ELMIRA, NEW YORK

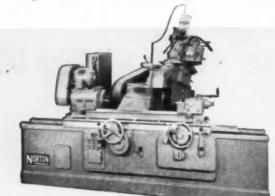




Norton CV-4 Grinder Cuts Production Time in Half

...at large west coast engine component plant





One Operation Does It! A Norton Type CV-4 10" Semiautomatic Angular Wheelslide Grinder was installed by the AiResearch Industrial Division of the Garrett Corporation to precision grind diesel engine turbocharger turbine wheels to increments as fine as .0005". Previous grinders performed 4 separate grinding operations. The Norton CV-4 increased efficiency and reduced grinding to a single operation. As a result, production time dropped from 19½ to 8½ minutes, for each turbocharger . . . a 56% reduction!

"Norton Type CV-4 Semiautomatic Angular Wheelslide Grinders combine shoulder and diameter grinding to give big operation economy."

Combining several precision grinding jobs and doing them faster and better is routine performance for this cylindrical grinder. For example, it leaves a concentric grain pattern on shoulders, improving the sealing quality and appearance. The CV-4 gives the "Touch of Gold" to your production by reducing effort, time and costs, and increasing your grinding profits.

- Automatic grinding cycle saves operator's time and effort and makes possible his tending more than one machine. Once the cycle starting lever is pulled the machine takes over and automatically grinds to size.
- Automatic wheel head mounted truing device provides pushbutton control of straight, stepped or formed wheel truing—eliminates need of skill and reduces wheel cost per piece ground.
- Ramped outlet from coolant tank speeds clean-out...pumps and motors all outside and easy to reach...electrical controls all grouped in raised enclosure...base ways protected by steel tape guards, requiring no additional floor space...hydraulic oil and ways lubricant carried in outside reservoirs with large gauge-glasses.

Type CV-4's can do the work of two or more ordinary cylindrical grinders in your plant. They are available with hand table or hydraulic power table traverse in 10" and 14" sizes, and in work lengths of 18", 36", 48" or 72". Improve your competitive position and increase your grinding profits — replace obsolete grinding equipment with these modern machines. Ask your Norton Representative for Catalog No. 1658-2, or write us direct. Remember, only Norton offers you such long experience in both grinding machines and grinding wheels

to bring you the "Touch of Gold" that helps you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass. In Canada: J. H. Ryder Machinery Co. Ltd., Toronto 5.

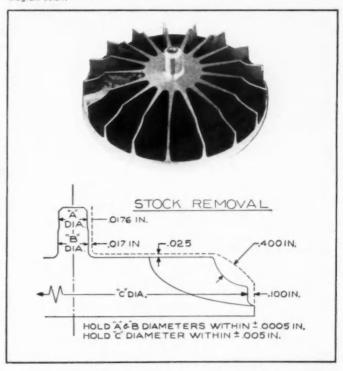


To Economize, Modernize with NEW





Set-And-Forget Automatic Operation Saves Labor . . . requires minimum of manual operation . . . loading, locating, starting cycle and unloading. Thus valuable labor is released for other work, yet precision is automatically maintained. For stock removal see diagram below.



Making better products...to make your products better
NORTON PRODUCTS Abrazives · Grinding Waters · Endange Machines · Retractories · Electractemicals — BEHR-MANNING DIVISION Coated Abrazives · Sharpening Stones · Pressure-Sentitive Tapes

NATIONAL MOTOR BOAT SHOW

(Continued from page 53)

Other models of the Interceptor line, which comprise four V-8's of 256, 272, 292 and 312 cu in. displacement, have been stepped up in horsepower. The new 135-hp (256 cu in.) replaces the prior 125; and the 170-hp (272 cu in.) has been increased from 165 hp. All models have a new rubber en-

gine mounting which is adjustable for positioning.

Detroit Diesel Engine Div. General Motors Corp.

First public showing was made of the Division's eight new 53 and 71 series two-stroke marine Diesels (basic engines were described in AI January 1, page 24). These new engines, when combined with the prior 71 and 110 series engines, extend the GM Diesel marine line to 19 single and multiple units, and the power range to from 20 to 1650 hp.

Engines in the entirely-new 53 marine series have a common 53 cu in. displacement per cylinder, and comprise two, three and four-cylinder in-lines and a six-cylinder V. Ratings in this series are from 20 to 195 hp; and base weights range from 740 to 1340 lb.

Four new V engines have been added to the 71 marine series. They consist of 6, 8, 12 and 16-cylinder models with maximum ratings from 252 to 675 hp. The 16V-71, rated 675 hp, weighs 7000 lb. The 8V-71, rated 334 hp, weighs about 3000 lb, is 61 in. long, 453_8 in. wide, and less than 47 in. high.

The display at the show included two 53 series of 97 and 130 hp, and three V-71 models of 334, 504 and 675 hp. Cutaways of the 4-53 and 6V-71 engines were also on exhibit.

Palmer Engine Co.

A new 8-hp single-cylinder engine and two redesigned engines were shown for the first time in the Palmer exhibit. This company's line of inboard engines now consists of nine—the single-cylinder, two fours, five sixes and a V-8—ranging from 8 to 250 hp.

The new single-cylinder engine, Model PW-27, is a watercooled unit designed for marine service around a Wisconsin assembly. It has a bore and stroke of 3½ in., for a displacement of 27 cu in.; and the 8-hp rating is at 2800 rpm. Reverse gear is standard equipment; and the unit's weight is 150 lb.

Vertical versions of the IH-240 and IH-264, based on International - Harvester truck engine blocks, have been redesigned for paired opposite rotation in twin screw installations. The port engine, in each case, has been turned end for end, so that both engine sets of carburetors, manifolds and accessories are inboard and opposite each other for accessibility. The two models of engines involved in the new redesign are of 240 and



Multiple-Spindle Drilling and Tapping Machines

Transfer-Type Processing Machines

Six and Four-Spindle Automatic Bar Machines

Hydro-Borer Precision Boring Machines

Core Box Rollover and Draw Machines

Die Casting Machines

Die Casting Machines

COOPERATION FOR AUTOMATIC PRODUCTION

The emphasis is on cooperation at Greenlee. Your ideas are added to Greenlee's. One idea sparks another.

The result . . . the creation of machines that will meet your requirements efficiently . . . economically . . . now and in the future. Top-flight Greenlee engineers help you avoid costly mistakes. Their thinking is sound . . . respected. Call Greenlee.

Let them give you the complete story on cooperation for automatic production.

OFFERS . . .



MACHINES DESIGNED WITH THE FUTURE IN MIND

GREENLEE

1746 MASON AVENUE ROCKFORD, ILLINOIS

Joe: these people have a lot of machines in Detroit fook them over and let me have your reaction - Same

Circle 157 on Inquiry Card, for more Data

264 cu in. displacement, respectively rated 120 and 135 hp at 3400

Universal Motor Co.

Latest engine in the Norseman series of inboard gasoline units is a V-8 rated 275 hp at 3600 rpm. It has a bore of 4.3 in. and a stroke of 3.7 in, for a total displacement of 430 cu in.; and a compression ratio of 7.5:1. Based on the Lincoln automobile engine, this unit, in the marine design, weighs 929 lb with

direct drive and hydraulic reversing gear.

The Universal line of engines includes three sixes, of 230, 237 and 340 cu in, displacement, with power ratings from 105 to 155 hp. The two smaller sixes have been upped 5 hp, and the largest upped 10 hp this year. Weight of the 155-hp, 340-cu-in. Super Six was reduced and is now 837 lb.

In the four-cylinder Universal line are five gasoline models, ranging from 12 to 70 hp.

Evinrude Motors

Refinements have been made in this maker's line of outboard motors-which for 1959 comprises nine re-styled models from 3-hp to the four-cylinder V-type 50-hp.

The $5\frac{1}{2}$, 10 and 18-hp models have a new by-pass type, thermostatically-controlled cooling system -which extends this feature to all ratings from 51/2 to 50 hp. Two of the 1959 models, the 35-hp Lark and the 50-hp Starflite, are equipped with a new high-torque 12-v starting motor.

New fiber glass covers have been adopted, with air intake underneath. Better sealing and more attention to rubber mounts have also contributed to quieter operation of all models.

Gale Products

The featured unit this year in the Buccaneer line of outboard motors is the new 35-hp Sovereign. Its two cylinders have a total displacement of 40.5 cu in., with 3-1/16 in. bore and 234 in. stroke. This motor, as well as one of the 25's, comes with 12-v electric starting and ignition key switch that is adaptable to remote operation. Its weight is 137 lb.

In the entire line of this maker are seven models, offered in five horsepower categories of 3, 5, 12, 25 and 35.

Johnson Motors

Johnson for 1959 is offering eight outboard models, in six power ratings of 3, 51/2, 10, 18, 35 and 50. The largest engine is the fourcylinder V-type that was introduced last year. All models feature completely new styling, which has been tied in with the use, for the first time, of fiber glass covers.

Thermostat cooling system regulator, introduced last year in the V-50 and Super 35, has been added this year to the 18, 10 and 51/2-hp models. The 10 and 18-hp models also now have new soft-rubber engine mounts.

The V-50 has been fitted with a new 121/8-in. diam propeller with pitch increased to 14 in. (versus last year's 13 by 13-in. wheel), which is said to increase speed sev-

(Turn to page 104, please)



Heavy-Duty



Spring Loaded



Heavy Duty Spring Loaded



Oil or Dry Multiple Disc

Heavy Duty Over Center



LONG LIFE



THESE EXCLUSIVE ADVANTAGES

Designed to meet the needs of Oil Field and other rugged service—this ROCKFORD Extra Heavy-Duty POWER TAKE-OFF

- Eliminates the Pilot Bearing
- Release and Main Bearings are lubricated for one year
- Main Bearings are 40,000 hour type
- Handles 5,000 pound Belt Loads
- Out-Board Bearings and Flexible Couplings eliminated
- Furnished with Single or Double Plate, Organic or Morlife® faced Gear tooth Type Clutches



Take-Offs

ROCKFORD Clutch Division BORG-WARNER

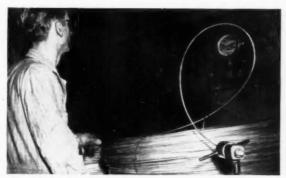
specifications. Suggests typical applications.

= 315 Catherine St., Rockford, III., U.S.A. =



HOW TO DETERMINE YOUR BEST TUBING VALUE!

Compare the tubing you now buy with these extra-value features available to you at no extra cost!



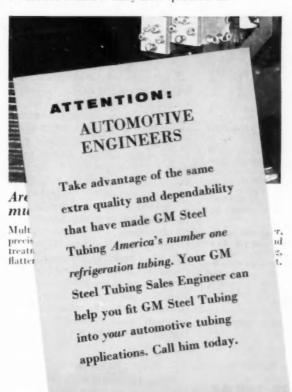
Is every inch of your present tubing pressure-tested and cleaned?

Every inch of GM Steel Tubing is pressure-tested and cleaned. Solvent is introduced under pressure to all bulk coils, checking structural strength and assuring an I.D. free of internal residue and cleaned to many times specifications.



Is your tubing rotary-straightened before serpentines are formed?

All straight lengths of GM Steel Tubing are rotarystraightened to maximum lengths of 80 feet. This process assures serpentines with better "flatness" characteristics for contact at all points on weld-wire condensers.





Is every serpentine double-checked pressure-tested and cleaned?

After each serpentine is formed, it is individually pressuretested and cleaned to assure further quality and dependability. These are just a few of the many extra-quality controls available with GM Steel Tubing that cost you no more,

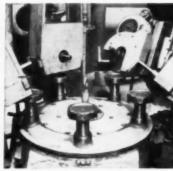






Auto maker races to a perfect finish

... cleans, blends 450 parts-per-hour with OSBORN Power Brushing



4 POWER BRUSHING HEADS plus a 6-station index table setup produce a quality finish for automotive clutch parts. Oaborn Monitors Brushes — working at 1750 rpm — automatically deburr and blend 450 parts-perhour in this low-cost operation.

THESE clutch back-up plates—product of a leading auto manufacturer—are quality finished at high production rates with versatile, low-cost Osborn Power Brushing.

The job requires blending sharp edges and surface junctures of the intricately shaped parts . . . plus thoroughly removing fine metal chips and burrs that could later cause trouble in the clutch assembly. This Osborn rotary power brushing setup does the entire blending and deburring job rapidly, uniformly, economically. Rate: 450 parts-per-hour.

Low-cost precision finishing like this can be applied to many types of products you build today. An Osborn Brushing Analysis — made in your plant at no cost or obligation—can pinpoint where you can speed production . . . improve quality . . . cut costs with modern power brushing methods. Write or wire us for details. The Osborn Manufacturing Company, Dept. E-73, Cleveland 14, Ohio.

Osborn Brushes (1)

BRUSHING MACHINES . BRUSHING METHODS
POWER, PAINT AND MAINTENANCE BRUSHES . FOUNDRY PRODUCTION MACHINERY

NATIONAL MOTOR BOAT SHOW

(Continued from page 102)

McCulloch Corp.

Eight outboard models are in the Scott (formerly Scott-Atwater) line for 1959. Horsepower ratings range from 3.6, to the three-cylinder 60-hp Flying Scott—new last year. All incorporate brand new styling; and one-piece fiber glass housings have been adopted.

The bore in the prior 22-hp unit has been increased to 2-51/64 in. and intake passages cleaned up. This current two-cylinder model has a piston displacement of 30 cu in. and is rated 25 hp at 4800 rpm.

Temperature indicating and generator indicating lights have been added on the 40-hp Royal Scott. All Scott models, except the smallest, feature the Bail-a-Matic automatic bailing device which can remove up to 300 gph. These models also have new rubber engine mounts, shock-absorbing propeller hubs, and new submerged water pumps.

Murray & Tregurtha, Inc.

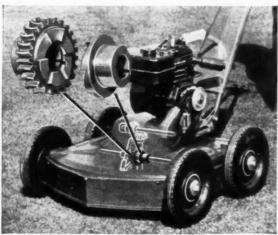
The most unusual powerplant exhibited at the show was a large outboard-Diesel propulsion unit of 97 hp, built as an experimental model. It was designed by Murray & Tregurtha and GM Diesel for potential applications in pleasure craft and work boats 28 ft and up. One of GM's new three-cylinder 53 series engines is used in this unit.

The unit's propeller can be rotated 360 deg, permitting thrust in all directions for steering. Full power reverse is attainable by rotating the propeller 180 deg. These operations are accomplished by remote control at the pilot's position. The unit also automatically tilts on impact with an underwater object; and can be elevated for beaching or transporting.

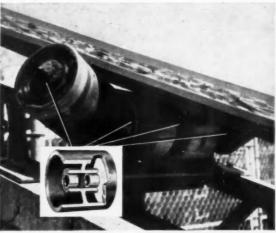
Oliver Corp.

Counter-rotating twin 35's, for a total of 70 hp, were featured in the Oliver exhibit. This company's outboard motor line for 1959 in-

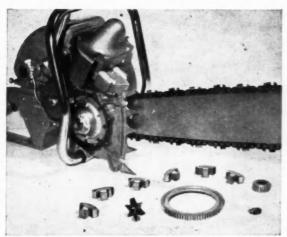
BOOST PRODUCT APPEAL with OILITE



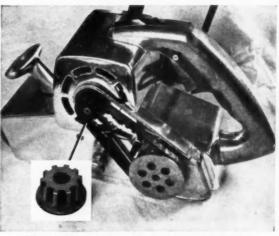
These 2 Oilite components now do the work of 4 former machined parts . . . contribute new economy, less upkeep.



Not one "squeak" from this conveyor . . . yet the dirt-encrusted Oilite bearings haven't been lubricated in 7 years.



Tough, wear-resistant Oilite gears, sprockets and clutch shoes keep costs low . . . make power saw more dependable.



The Oilite pulley of this heavy-duty belt sander provides yet another example of improved performance at less cost.

Quality-built OILITE®* parts and bearings add sales appeal to many fine products. For one thing, close tolerance Oilite parts wear less, weigh less and are quieter running . . . and Oilite bearings are tougher, maintenance-free.

Only Chrysler Makes Oilite

For another, Oilite components drastically reduce cost by eliminating material waste and costly machining. Why not contact your Oilite representative today? Look for him in the Yellow Pages under "bearings — Oilite" or write Dept. K-2.



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AMPLEX DIVISION

CHRYSLER CORPORATION, DETROIT 31, MICHIGAN SELF-LUBRICATING BEARINGS . PRECISION PARTS . METAL FILTERS . FRICTION UNITS

cludes 6, 16 and 35-hp models.

The Bendix - Scintilla ignition system on the 35 Olympus motor has been improved, and now produces 18 kv at full throttle and up to 25 kv at trolling speeds. Other refinements in this motor are new combustion chamber shape, improved carburetor calibration, and added counterbalance weight on crankshaft, all for improved idling.

Nylon bearings are now provided on external control connections, for salt water corrosion-resistance.

West Bend Aluminum Co.

New this year in the West Bend line of outboard motors is the 40-hp Golden Shark, a two-cylinder unit with 42.18 cu in. total displacement. Power rating is at 4750 rpm; and its weight is 137 lb. One of its features is the new "Synchro-Drive" remote control—which combines in one unit a single lever for shifting and throttling, and an ignition key switch which can be used for electrically choking the motor (by pushing in), as well as

for starting, stopping, and locking.

The 1959 line of this builder is comprised of nine models with seven horsepower ratings—from the 2-hp 28-lb Shrimp to 6, 8, 12, 16, 35 and 40 hp. The 35 and 40 electric-starting models both have a new 20-amp alternator for battery charging.

Kiekhaefer Corp.

In the 1959 Mercury outboard motor line are nine models, from 6 to the six-cylinder 70-hp. This maker has moved into two new power classes this year—15 and 35 hp. The two-cylinder Mark 15A now gives the company four engines in the "fishing" class—6, 10, 15 and 22 hp. The four-cylinder Mark 35A provides five models in the upper power range—35, 40, 45, 60 and 70 hp.

All 1959 Mercurys of 35 hp and over are available as electric-starting models with built-in generators. Propeller slip clutches are standard.

BOOKS ...

COATED ABRASIVES — MODERN TOOL OF INDUSTRY, by Coated Abrasives Manufacturers' Institute, published by McGraw-Hill Book Co., Inc., 330 West 22nd St., New York 36, N. Y. Price, 48.50. Here is a compresensive and authoritative guide to the use of coated abrasives in industry, covering their characteristics, advantages, applications, and efficient methods of use. The book shows how the abrasives are manufactured, and describes all factors of their effective use in the metalworking (ferrous and non-ferrous), woodworking, glass, and plastics industries, in applications ranging from heavy material removal to fine polishing. It gives comprehensive coverage of many recent advances, including new automatic machinery, and applications such as strip scouring, pre-plate finishing and contour finishing, and discusses such special topics as cutting oils, coolants, and lubricants specifically for use with coated abrasives. All the material is aimed toward helping manufacturers decide what operations in their plants may be done better with coated abrasives, and provides specific methods showing how to achieve the most efficient and economical results in their

GAS TURBINES FOR AIRCRAFT, by A. W. Judge, published by Chapman & Hall Ltd., 37 Essex St., London, W. C. 2, England. Price 60s net. This book covers the entire field of gas turbines from their aerilest development to their application to aircraft jet propulsion systems. The author discusses the various types of aircraft gas turbine engines and devotes separate chapters to such matters as fuel, combustion, lubrication, maintenance, special materials, special types of aircraft engines, and thermodynamic considerations.







SERVICE IN STAINLESS STEEL

"FLIGHT OF PROGRESS" a stainless steel sculpture by Robert Edward Hamilton

In the past 12 months 91% of all orders for J&L stainless steel bars were shipped, at least in part, within 24 hours.

That's service!

The key to such service is a simple one: Complete and balanced inventories at the Mill and at strategically located Service Centers only hours from your plant or warehouse.

With the most modern flat rolling facilities in the industry now in operation at Louisville, Ohio, J&L is now giving the same service on flat rolled products that fabricators and warehouses have been getting on J&L bars and wire.

Whether you need stainless sheet, strip, bar or wire for your production line or your warehouse customers, you can get it faster from J&L.

Plants and Service Centers:

Los Angeles • Kenilworth (N. J.) • Youngstown • Louisville (Ohio) • Indianapolis • Detroit



Jones & Laughlin Steel Corporation • STAINLESS and STRIP DIVISION • Box 4606, Detroit 34

Circle 164 on Inquiry Card for more Data

Design for low friction, reliable operation with TFE-FLUOROCARBON RESINS IMPROVED PERFORMANCE of transmissions is assured by the use of clutch lever bearings and switch diaphragms made of TFE resins. There are at least six more ways TFE resins can be used in automatic transmissions - as bearings, seals, hose and lubricant. These resins are unaffected by hot oil, grease, water, gasoline, hydraulic fluids, anti-freezes and combustion products

Have you looked recently into new ways of using Du Pont TFE-fluorocarbon resins? Important advantages such as the low friction of these resins—in combination with other outstanding properties—can help increase the efficiency of your automotive assemblies.

For instance, parts for transmissions are now made of TFE resins. They resist heats of 500°F, continuously, and are totally unaffected by automotive chemicals. TFE resins make possible less costly design, case of assembly, and simple methods of reducing friction. Coefficients as low as 0.016 have been measured. In power-steering units, carburetors and engine valves, too, components of TFE resins are also solving difficult design problems.

TFE resins offer superb sealing properties . . . use them as packings, gaskets, O rings. Bearings of TFE resins eliminate the need of lubrication—they are especially useful for heavy loads at low speeds. Filled TFE resins provide improved mechanical properties. Where COST SAVINGS and RELIABILITY are important. TFE resins may provide an unexcelled answer.

Your opportunities for better automotive designs may lie in the barely tapped potentials of Teflon TFE resins. For more information, see your local supplier or write to: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Dept., Rm. T-5-2-15, Du Pont Building, Wilmington 98, Delaware. In Canada: Du Pont of Canada Limited, P. O. Box 660, Montreal, Quebec.



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

.....



TFE-FLUOROCARBON RESINS

including the TFE (tetrafluoroethylene) resins discussed herein.

mending the ire (tetratiuoroethylene) resins discussed herein.

News of the

MACHINERY INDUSTRIES

(Continued from page 74)

new orders have pointed upward since the negative slope started in the 4th quarter of 1955. It appears the industry is beginning to replace its obsolete machine tools. In 1958 approximately 60 per cent of all machine tools in the U. S. industry were 10 years old or more, and 20 per cent were 20 years old or more.

"With this present upturn, perhaps additional delayed orders will be entered as firm orders to beat a possible shipment delay in the event new order increases advance more rapidly than the skilled men can be called back to work."

Distributors All Set For Spring Meeting

The program lined up for the 35th Spring Meeting of the American Machine Tool Distributors' Association is attractive and should culminate in a lot of active participation.

Scheduled to be held at the Sheraton-Park Hotel in Washington, D. C. on March 18th and 19th, the meeting will have as its theme "Progress in Machine Tool Distribution—in Proposals—Industry Relations—Government."

One of the features of the program is a panel discussion on "The Whys and Wherefores of Government Machine Tool Programs." Members of the panel will be: Edwin McElwain, Covington & Burling; J. H. Williams, Dept. of Defense; H. W. Smith, Office of Civilian and Defense Mobilization; G. E. Merryweather of Motch & Merryweather; W. B. Stults, Select Committee on Small Business, U.S. Senate; N. A. Olsen, Business and Defense Services Administration: and J. H. Myers, Cincinnati Shaper Co. The session is to be moderated by James C. Kelley, AMTDA general manager.

Another highlight will be a discussion of ways and means of improving builder-distributor selling—by a panel composed of machine tool builders, with Ralph J. Kraut, president of NMTBA, acting as

moderator. Panel members will be K. M. Allen, Rockford Machine Tool Co.; D. R. Danly, Danly Machine Specialties, Inc.; T. T. Kling, Lodge & Shipley Co.; and D. R. Weedon, Blanchard Machine Co.

The convention activities will begin with a welcoming reception to be held at 6:00 PM on Tuesday, March 17. Members of the U. S. Senate and the House of Representatives have been invited to attend as guests of AMTDA.

Around the Industry

National Automatic Tool Co., Inc.—N. M. Forsythe, president, recently announced the purchase of The Jes-Cal Co. of Fraser, Mich., maker of honing tools. C. P. Smith, formerly chief engineer of Jes-Cal, will continue as vice-president and general manager of Natco's new subsidiary. F. J. Jeschke and G. M. Calvert, former co-owners of Jes-Cal, have been appointed vice-presidents.

Wheelabrator Corp.—a new line of vertical spindle machines for precision finishing of parts not adaptable to conventional barrel finishing methods, has been introduced by Techline Div. Manufacturing rights were purchased from John Wisler, original designer of the equipment. The machines are available in models with 4, 8 and 16 spindles and with power drives from 5 to 30 hp.

Giddings & Lewis Machine Tool Co.—Harry C. Soukup is new general manager and Edward F. Woytych is now works manager for the company's Fond du Lac division.

Pratt & Whitney Co., Inc.—Wallace S. Whittaker has been elected chairman of the executive committee of P & W; and chairman of the board of Potter & Johnston Co.

James H. Daley has been named sales manager of the Machine Tool Div. James D. Allan will remain with the company as a sales consultant until his retirement in July.



OVERBRAIDED BRAKE LINE made with hose of a TFE resin is used in winner of Indianapolis Memorial Day racing classic. Brake line is unaffected by heat, pressure, corrosives. Because of their low volumetric expansion, TFE resins give a firm pedal to the brake system.





Better Things for Better Living . . . through Chemistry

Circle 165 On Inquiry Card, for more Data

Special Low Cost Machines

(Continued from page 61)

draulic control unit built by the Case engineering staff. Tapping of the drilled holes, the next operation, is done on a machine built up from the shell of a drilling and tapping machine, with U. S. Drill heads separately purchased and installed by the company. The hy-

Totally enclosed fan-cooled 27 volt DC

will assure required dependability.

motor for pump drive. Frame 2 x 11/2

draulic feeds were installed by the company also. Manual clamping is used.

Milling of the front and rear end pads for attaching of the torque tube and the power take-off housing or cover plate is done on a Cincinnati double end mill. Both rough and finish cuts are made in this setup. An Ingersoll drum mill, with two fixtures mounted at 180 deg, does rough and finish milling on two sides to machine the mounting faces for the rear axle housing.

The drilling of the two end mounting pads is done on a built-up special purpose machine which has a steel weldment for a base, and two Michigan drill heads mounted on it. The fixture for holding the workpiece uses air clamping. These holes are tapped in the next operation, performed on another built-up machine having a weldment base, with U. S. Drill heads. The fixture on this machine has automatic hydraulic clamping operated from a company-built master cylinder.

The two side pads on which the rear axle housing is mounted are drilled on a third built-up machine having a weldment for the base. Two Michigan drill heads are mounted on this base, with two heavy fixtures on the machine table. Both fixtures have automatic clamping and automatic indexing features. The holes are tapped on a fourth built-up machine, having U. S. tapping heads mounted on a welded base. This machine has automatic feed and automatic clamping. The bottom pad on the transmission case is drilled on a Bausch multiple drill. Holes for the reverse idler shaft and the center shift rail are drilled on a built-up machine having a welded base and U. S. Drill head and a standard feed and tool unit. Manual clamping is used on this machine.

Several internal bores, mounting holes on both ends, and dowel pin holes are done on a Moline Tool Co. four-way boring machine. In the final machining operation several miscellaneous holes are drilled on a Cincinnati-Bickford radial drill. The castings then go to a wash rack, and to the assembly line.



BOOKS ...

BALL TUBE AND ROD MILLS, by H. E. Rose and R. M. E. Sullivan, published by the Chemical Publishing Co., Inc., 212 Fifth Avenue, New York, N. Y. Price \$6.00. This book throws new light on the internal mechanics of mills relating to powdered materials. The authors give a comprehensive analysis of the ball, tube and rod mill operations, including a formula for the calculation of the instantaneous rate of production of specific surface from a knowledge of various parameters. Among the subjects covered are: the motion of the mill charge, the power to drive a mill, comminution of solid bodies, grinding within the mill, and surging and vibration in a mill.

The next step is translating this information into a motor design having the electrical and mechanical characteristics needed for your particular application.

1% × %

24 Volt DC fuel valve actuator incorporates gear train torque-limiting

clutch and limit switches, Frame

We then custom manufacture the motor on a volume basis to obtain high quality, uniformity and the most favorable cost.

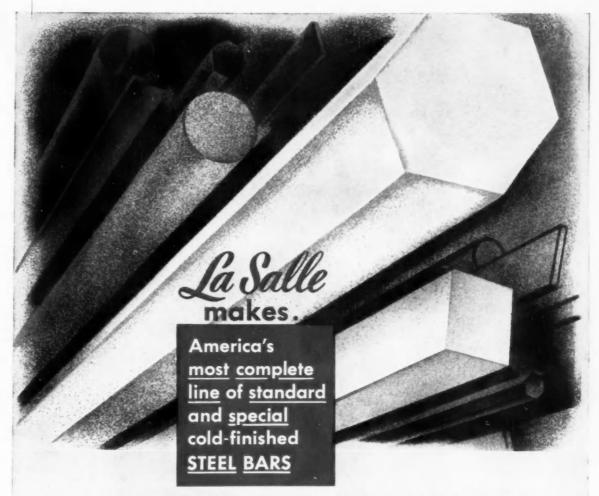
Thorough study by our engineering department of your product and its operating conditions is the first step in designing a Lamb Electric motor that

May we discuss these advantages of Lamb Electric motors with you?

THE LAMB ELECTRIC COMPANY . Kent, Ohio

A Divison of American Machine and Metals, Inc.

In Canada: Lamb Electric - Division of Sangamo Co. Ltd. - Leaside, Ontario



Rounds . . flats . . extra wide flats . . squares . . hexes. Always available in a full range of popular standard sizes and lengths.

Cold-drawn . . turned and polished . . ground and polished. Exceptional size accuracy, straightness, concentricity, and uniformity. Produced to standard or special tolerances.

Carbon and alloy steels. La Salle produces a broad line of high quality cold-finished steel bars in AISI and SAE carbon and alloy grades.

Screw machine steels. For improved machinability and increased production, La Salle offers the finest lead treated or resulphurized steel bars.

Furnace treated steels. Careful furnace treatment develops required physical properties through quenching and tempering. Annealing improves machinability.

-AND THESE EXCLUSIVE SPECIALTY STEEL BARS:

FATIGUE-PROOF®.. produced by "e.t.d." (Elevated Temperature Drawing) process. Guaranteed 140,000 psi minimum tensile. Fast machining. No heat treating necessary.

 ${\tt STRESSPROOF}^{\oplus}$ with copper . . contains copper for improved machinability and other properties. Guaranteed yield, 100,000 psi in all sizes.

LA-LED® . . a lead bearing, fast machining steel. Machines twice as fast as B-1112 . . 45% faster than B-1113. Excellent ductility . . sounder cross section. Permits better carburizing.

Super LA-LED®. . fastest machining steel ever commercially developed. Ideal for parts which previously could be machined economically only from brass. Excellent ductility and carburizing qualities.

Please send the following literature:

Ask for any or all of these reference materials on La Salle cold-finished steel bars



	How to	o mak	e vour	own	machine	and
_	repair	parts	quicke	r and	l easier	

☐ Wall chart listing 241 AISI grades of cold-finished steel bars

☐ La Salle Leaded Steels
☐ A new material . . (the story of FATIGUE-PROOF steel bars)

FATIGUE-PROOF steel bars)

Today's Improved La Salle
STRESSPROOF steel bars

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Company	
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FAIRFIELD GEARS!

POWER to operate these machines and countless others that you may see every day, travels smoothly, efficiently, dependably through FAIRFIELD GEARS. By specializing exclusively in "Fine Gears Made to Order" Fairfield has become one of America's largest independent producers of these parts.

If you use gears in the product you make, we believe it will pay you, as it has others, to become acquainted with FAIRFIELD-the place where fine gears are produced to meet your specifications EFFICIENTLY, ECO-NOMICALLY! Fairfield's production facilities are unexcelled. Call or Write.

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More Government Contract Awards

ATEST contracts awarded by varid ous Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are: passenger cars, motor trucks, aircraft, military tanks, engines, transmissions, other components, spare parts, plant equipment, etc. This list is for the period January 1 to January 31, inclusive.

AVCO MANUFACTURING CORP., LY-COMING DIV., Stratford, Conn.

Aircraft engines, various-\$4,600,000 BENDIX AVIATION CORP., BENDIX-PACIFIC DIV., North Hollywood, Calif.

Valves, hydro power brake, various aircraft, various-\$44,072

BENDIX AVIATION CORP., BENDIX PRODUCTS DIV., South Bend, Ind. Aircraft, wheel and brake assys.—\$1,-612,010

BENDIX AVIATION CORP., ECLIPSE. PIONEER DIV., Teterboro, N. J. Motor, 235 ea-\$27,770

BOEING AIRPLANE CO., Seattle, Wash. Aircraft, spare parts, ground support equipment—\$2,962,526

BOEING AIRPLANE CO., INDUSTRIAL PRODUCTS DIV., Seattle, Wash. Repair parts, gasoline engines, 7,187 ea -\$168,437

CHRYSLER CORP., Detroit, Mich. Automotive spare parts, replenishment -\$2,122,340

CHRYSLER MOTORS CORP., Detroit, Mich. Bus, 37 passenger, 137 ea-\$665,489

CHRYSLER MOTORS CORP., Detroit, Mich. Trucks, various, 583 ea-\$2,321,794

CHRYSLER MOTORS CORP., Washington, D. C. Station wagons, 15 ea-\$27,953

CHRYSLER MOTORS CORP., Washington, D. C. Trucks, 19 ea-\$51,475

CHRYSLER MOTORS CORP., Washington, D. C.

Trucks, passenger cars, 1,996 ea-\$3,-235,616

CLARK EQUIPMENT CO., INDUS-TRIAL TRUCK DIV., Battle Creek,

Forklift trucks, 2 ea-\$10,511

CLEVELAND PNEUMATIC TOOL CO., Cleveland, Ohio Spare parts, various aircraft-\$820,603

CONTINENTAL AVIATION & ENGI-NEERING CORP., Detroit, Mich. Engines for Q2C drones-\$750,000

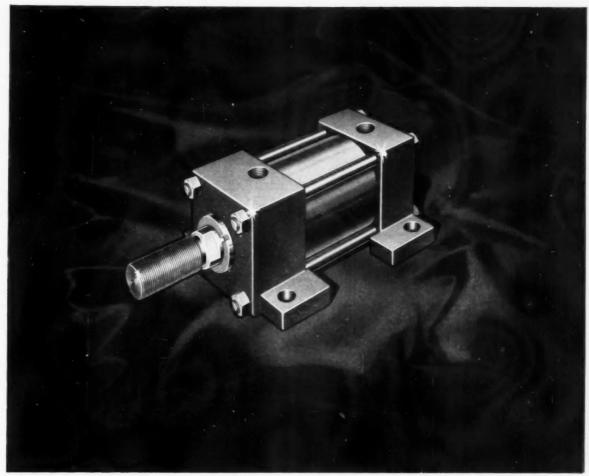
CONTINENTAL AVIATION & ENGI-NEERING CORP., Detroit, Mich. J-69-T-25 engines-\$283,219

CONTINENTAL MOTORS CORP., Muskegon, Mich. Automotive spare parts, replenishment

CONTINENTAL MOTORS CORP., Mus-

kegon, Mich. Engines, spare parts for M56 vehicle-\$516,237

(Turn to page 116, please)



Illustrated-Logan Super-Matic Cylinder

the ultimate in hydraulic cylinder design



FREE SEND FOR THE "LOGAN CALCULATOR"

MEMBER: Natl. Mach. Tool Builders* Assn.; Natl. Fluid Power Assn.

LOGANSPORT MACHINE CO., INC. 860 CENTER AVENUE, LOGANSPORT, INDIANA PLEASE SEND COPY OF CATALOG: G: 200-1 HYD. POWER UNITS 200-2 ROTOCAST HYD. CYLINDERS 200-3 750 SERIES HYD. CYLINDERS 200-4 and 200-7 HYD. VALVES ☐ 100-1 AIR CYLINDERS ☐ 100-2 MILL-TYPE AIR CYLS. ☐ 100-3 AIR-DRAULIC CYLS. 100-4 AIR VALVES 100-5 LOGANSQUARE CYLINDERS 200-6 SUPER-MATIC CYLS. 100-5-1 ULTRAMATION 300-2 PRESSES ABC BOOKLET FACTS OF LIFE CIRCUIT RIDER TO: NAME___ COMPANY ADDRESS

Meets J.I.C. Standards

Assembly Techniques for Aluminum Transmission Housing

(Continued from page 64)

new high-speed machine which automatically installs the wire thread inserts and breaks off the driving tang. The machine is equipped with two separate stations; one loads, aligns and simultaneously drives three Heli-Coil inserts, while the second breaks the driving tang and catches the broken tang. Both units are part

of a transfer line built by the Majestic Tool Co., Cincinnati, O., which drills and taps 105 different holes in each transmission housing.

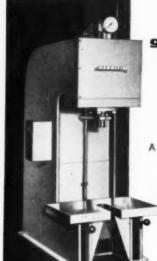
Operation of the Heli-Coil machine is continuous. After pressure testing, the castings are moved by roller conveyor to one of two machines from an inspection area. A central feeding station is used to

divert the housings to the proper machine where they are automatically loaded onto a sequence transfer-bar. The capacity of each inserting machine is 120 transmission housings per hour.

Installation of inserts is completely automated-from orienting and feeding the inserts to positioning and driving. Above each unit, three individual hopper units are equipped with arms that rotate through the hopper pan loaded with inserts. The hopper has a capacity of 1500 inserts that are picked up at random and automatically oriented. Inserts are dropped from a reservoir to the inserting tool. An air jet increases the velocity of each insert as it slides through a nylon tube into the inserting tool. The insert is pre-wound and, as the tools move to the housing, the inserts are screwed through a prewinder tip into the transmission housing as the tool slide moves forward. After the inserts are installed, the carriage returns and a sweep mechanism cycles between the tool tips and the transmission housing on a routine and automatic inspection check.

The tang break-off station is equipped with three impact punches with a unique coil-retaining sleeve which supports the last coil of each insert at the time of impact.

A specially shaped tang catcher is swung in back of each transmission housing by an air-actuated rack and pinion. After the tangs are broken off, the catcher returns to its original position. As it reaches this position, a trap door in the bottom of the catcher is opened and the tangs are dumped into a disposal container.



get more production at lower cost with HANNIFIN "FD" PRESSES

A COMPLETELY NEW LINE OF HIGH-SPEED HYDRAULIC BENCH PRESSES

FAST DELIVERY—ALL THESE SIZES! 2, 3, 4, 5, 6, 8, 10 and 12 TONS

> HEAVY-DUTY OPEN-GAP PRODUCTION PRESSES

Our quantity production gives you highest quality at lowest cost.

THEY HAVE "EVERYTHING" ...

Dual Safety Hand Lever Controls
Dual Electric Push-Button Controls
Adjustable Stroke Control
Reverse on Pressure or Distance
Full Automatic Cycling
Hannifin High Speed Hydraulic Index Tables
Reciprocating Hydraulic Slide Feeds

USE THEM FOR...
Assembly Operations
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Riveting — Staking
Forming — Stamping
Trimming Die Castings
Trimming Plastics
Molding Semi-Conductors
Preforming — Compacting

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Call in your nearby Hannifin man-he's a trained production analyst-to prove how you can do more at lower cost with Hannifin presses. Or, write for our new Bulletin 132A. It tells the whole story.

HANNIFIN COMPANY

543 South Wolf Road . Des Plaines, Illinois

- A DIVISION OF PARKER-HANNIFIN CORPORATION -

New "Plioprene" Rubber Now In Production at Goodyear

Goodyear Tire & Rubber Co. is producing a new rubber called Plioprene, said to provide a softer ride with reduced tire squeal.

Goodyear research vice-president Dr. R. P. Dinsmore says the new rubber improves stability and roadholding qualities of tires. He says it also reduces vibration, road rumble and "expansion joint thud."



The little booklet on alloy steels that grew into a <u>textbook</u>...

Quick Facts about Alloy Steels appeared for the first time in 1956, as a collection of reprints of a series of Bethlehem advertisements in metalworking magazines.

The small booklet was well received, and we kept adding more of the informative advertisements as we reprinted it to keep up with demand. Today, it has grown to 40-page size, and is in its Third Edition. More than 20,000 booklets have been distributed at the written request of executives, engineers, designers, and others, who have found *Quick Facts* to be an authoritative small textbook on the funda-

mentals of alloy steels. Here's what a U. S. Navy engineer wrote:

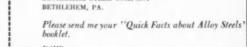
"Quick Facts is a small textbook of information—a booklet that has been needed for a long time. One of my associates and I had a metallurgical problem involving alloy steels. We just didn't have the information. A friend showed me a copy of your booklet Quick Facts, and there on one page, under the subject 'Determining Depth Hardness,' was just what we wanted to know!"

The current booklet contains reprints of the complete series of advertisements, on such subjects as, "What is an Alloy Steel?" "Effects of Elements," "Grain Size," "Heat-treatment," "Quenching Media," and others. It's written in concise, layman's language, from data compiled by Bethlehem's metallurgical engineers.

Would you like a copy of the Quick Facts booklet? Just fill out and send in the coupon.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor. Bethlehem Steel Export Corporation

BETHLEHEM STEEL



BETHLEHEM STEEL COMPANY

PUBLICATIONS DEPARTMENT, ROOM 1030

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- STRONG
- FLEXIBLE
- DURABLE
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This light, strong, flexible tubing meets stringent performance requirements at a fraction of the cost of metal tubing with required flexible couplings and intermediate fittings. And it is easier to install—saves assembly time. Available in 1000 psi and 2500 psi grades which conform to J.I.C. specifications for low and medium pressures.

Advantages include: high pressure rating at low cost; long flex and vibrational life; resistance to oils, greases, solvents; wide service temperature range; crush and abrasion resistance adaptability to standard metallic fittings.

Other feasible automotive applications are lubrication systems, fuel lines, oil lines, hydraulic systems.

For prompt service, contact one of The Garlock Packing Company's 30 sales offices and warehouses in the U.S. and Canada, or write

The Garlock Packing Company,

United States Gasket

Plastics Division of GARLOCK



Contract Awards

(Continued from page 112)

CURTISS WRIGHT CORP., WRIGHT AERONAUTICAL DIV., Wood-Ridge, N. J.

Engines, aircraft-\$7,607,295

DANA CORP., Toledo, Ohio Shaft assy., propeller—1169 ea—\$43,895

DOUGLAS AIRCRAFT CO., INC., Charlotte, N. C.

NIKE spare parts and components-\$386,698

FIRE MASTER CORP., Mt. Clemens, Mich.

Truck, fire fighting, 7 ea-\$72,100

FORD MOTOR CO., FORD DIV., Washington, D. C. Sedans, 794 ea—\$1,449,379

FORD MOTOR CO., FORD DIV., Washington, D. C.
Trucks, 608 ea—\$1,146,503

GAR WOOD INDUSTRIES INC., Wayne, Mich.

Automotive spare parts, replenishment -\$25,860

GENERAL DYNAMICS CORP., CON-VAIR DIV., San Diego, Calif. Spare parts, aircraft—\$39,742

GENERAL ELECTRIC CO., Schenectady, N. Y. Repair parts, turbines—\$53,750

GENERAL MOTORS CORP., CHEVRO-LET MOTOR DIV., Detroit, Mich. Bus, 17 passenger, 15 ea-\$51,756

GENERAL MOTORS CORP., CHEVRO-LET MOTOR DIV., Detroit, Mich. Coupes, 18 ea—\$28,149

GENERAL MOTORS CORP., CHEVRO-LET MOTOR DIV., Detroit, Mich. Trucks, passenger cars, 3,001 ea—\$4,= 542,230

GENERAL MOTORS CORP., CHEVRO-LET MOTOR DIV., Detroit, Mich. Trucks, various, 50 ea.—\$139,346

GENERAL MOTORS CORP., DETROIT DIESEL ENGINE DIV., Detroit, Mich.

Marine diesel propulsion engine, 40 ea-\$105,232

GENERAL MOTORS CORP., FOREIGN DISTRIBUTORS DIV., New York, N. Y. Trucks, 19 ea—\$33,400

GENERAL MOTORS CORP., TRUCK & COACH DIV., East Pontiac, Mich. Automotive spare parts, replenishment — \$75,270

GENERAL MOTORS CORP., TRUCK & COACH DIV., East Pontiac, Mich. Bus, motor, 30 ea—\$219,841

GENERAL MOTORS CORP., UNITED MOTORS SERVICE DIV., Detroit, Mich.

Automotive spare parts, replenishment - \$55,727

GENERAL MOTORS CORP., UNITED MOTORS SERVICE DIV., Detroit, Mich.

Military vehicle replacement parts-\$30,274

GENERAL TIRE & RUBBER CO., Akron, Ohio Wheel assy., aircraft, 6,266 ea—\$371,208

Wheel assy., aircraft, 6,266 ea—\$371,208

B. F. GOODRICH CO., B. F. GOODRICH
AVIATION PRODUCTS DIV., Day-

ton, Ohio Spare parts, aircraft—\$52,098

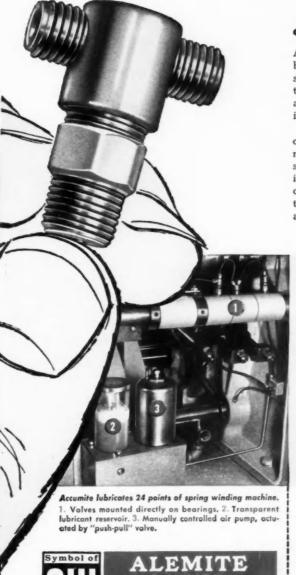
GOODYEAR TIRE & RUBBER CO., Akron, Ohio

Linings, various aircraft, various—\$64, • 962

(Turn to page 120, please)

ACCUMITE

...TO GIVE ANY MACHINE ALL THE ADVANTAGES OF CENTRALIZED LUBRICATION ... AT LOW COST!



Engineered for limited space, outperforms many higher-priced systems!

Alemite—with more than 40 years of centralized lubrication experience—announces an all-new compact system complete with pump, metering valves and controls—especially designed to service many machines and vehicles where centralized lubrication has been impractical until now!

Alemite's new compact Accumite system is especially adaptable to light, precision, multiple-bearing machines that have limited installation space. Its small size and simple installation overcomes cost limitations in most plants. Typical applications are: packaging, canning, labeling and textile machines...and machine tools. It is also suitable for tractor trailers, lift trucks and farm implements.

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- Avoids work spoilage and bearing repairs due to overlubrication.

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Please send me all the facts about your new "Miniature" Accumite system.

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Republic ELECTRUNITE Mechanical Tubing is used in four locations across the top of the automatic apparatus that picks up and sets the bowling pins in

place. The AMF Automatic Pinspotter is manufactured by the American Machine & Foundry Company, Brooklyn, New York.

AMF... builds a better pinspotter for better bowling with Republic ELECTRUNITE Mechanical Tubing

On the initial order, Republic ELECTRUNITE® Mechanical Tubing saved American Machine & Foundry Company \$34,000 in manufacturing their famous AMF Automatic Pinspotter.

AMF had been using tubing that required a boring operation on each end of the tube and centerless grinding on the O.D.

Because Republic's ELECTRUNITE Mechanical Tubing met AMF's O.D. tolerance requirements, the company was able to eliminate the boring and grinding operations. This resulted in a savings of \$15,000 in fabricating operations. Another \$19,000 was saved on the cost of ELECTRUNITE as compared with the tubing used previously.

In uniformity and quality, in fabricating, in original costs, Republic's ELECTRUNITE Mechanical Tubing can save you time and money, too! Call your Republic representative, or write today.



Republic ELECTRUNITE Mechanical Tubing is delivered, cut to length, ready for fabricating. ELECTRUNITE Tubing is "electrically welded" resulting in built-in uniformity.



Stats to hold spotting cups in place are cut into ELECTRUNITE Tubing by machine. Concentricity of the ELECTRUNITE assures easy fabrication and smooth mechanical operation.



Drilling and cutting complete, the ELECTRUNITE Tubing is ready for assembly. Lightweight ELECTRUNITE offers uniform wall thickness, strength, ductility for greater serviceability.



Sensitivity in setting off-spot pins is the result of design and engineering, highest quality workmanship, and highest quality materials, such as Republic's ELECTRUNITE Tubing.



REPUBLIC NYLOK® FASTENERS SAFEGUARD PERFORMANCE SPECIFICATIONS.
Republic fosteners are used extensively on Gemco Rotary, Reel, and Riding
Power Lawn Mowers. Inset shows blade assembly securely locked to engine
shaft with Nylok Cap Screw. An added advantage of Republic Nylok Bolts
and Cap Screws is their ability to seal against fluid escape when wrenched
tight. Nylon pellet in bolt body blocks flow of fluid along helical threaded
path. Send for data.



REPUBLIC MANUFACTURERS' COARSE WIRE to meet every production need. Box Binding and Stapling, Brush Handle, Chain, Garment Hanger are only a few of the qualities regularly produced. Large tonnages are shipped to manufacturers of fan guards, wire partitions, concrete reinforcing specialties, plated shelves, racks and grilles, and numerous other products. Republic wire metallurgists are available to help you in solving production problems. Write today.



REPUBLIC HIGH STRENGTH STEEL IMPROVES SERVICE LIFE for many types of equipment. In the bottom of this conveyor, for example, it provides excellent resistance to abrasion and corrosion. Far less frequent replacement is required as compared with a bottom made of ordinary steel. And, its high strength-to-weight ratio allows use of lighter gages. Send for details.

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□ NYLOK Bolts and Ca	p Screws
Name	Title

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Contract Awards

(Continued from page 116)

GOODYEAR TIRE & RUBBER CO., Akron, Ohio Wheel assy., aircraft, 1,147 ea-\$82,928

HUCK MFG. CO., Detroit, Mich. Huckbolts-stainless steel, 227,000 ea-\$42.447

NTERNATIONAL HARVESTER CO., Melrose Park, III. Tractor, full tracked, low speed, 314 ea INTERNATIONAL

-85,922,216

INTERNATIONAL HARVESTER CO., Washington, D. C. Trucks, 51 ea-\$153,044

LANDIS TOOL CO., Waynesboro, Pa. Grinder, cylindrical, 1 ea-\$30,172

NEW YORK AIR BRAKE CO., Watertown, N. Y. Pumps, various aircraft, various-\$252,-

NORTH AMERICAN AVIATION, INC., Canoga Park, Calif. Rocket engines-\$585,000

NORTH AMERICAN AVIATION, INC., Los Angeles, Calif. Airplanes, spare parts, ground han-dling equipment \$1,500,000

NORTHROP AIRCRAFT INC., NORTH-ROP DIV., Hawthorne, Calif. Spare parts, various aircraft—\$898,923

NORTHROP AIRCRAFT INC., RADIO-PLANE CO. DIV., Van Nuys, Calif. OQ-19D drones—\$894,711

FRANK G. SCHENUIT RUBBER CO., Baltimore, Md.

Aircraft tires, inner tubes, 5,111 ea-\$879,618

SOUTHERN COACH & BODY CO., INC., Evergreen, Ala.

Semi-trailer, personnel, 70-80 passenger, 23 ea-\$109,825

SPRAGUE DEVICES INC., Michigan City, Ind. Motor, w \$375,220 windshield wiper, 60,315 ea-

UNITED AIRCRAFT CORP., SIKORSKY AIRCRAFT DIV., Stratford, Conn. Helicopters-\$13,860,000

WESTERN ELECTRIC CO., INC., Winston-Salem, N. C. Spare parts-\$141,140

WESTERN ELECTRIC CO., INC., New York, N. Y.

NIKE spare parts and components— \$898,577

WESTINGHOUSE ELECTRICAL CORP., Kansas City, Mo. Engines—\$15,145,600

WESTINGHOUSE ELECTRIC CORP., Washington, D. C. Welder, 45 ea-\$39,397

WHITE MOTOR CO., REO DIV., Lansing, Mich. Wheel, fifth assy., 465 ea-\$80,538

WHITE MOTOR CO., Cleveland, Ohio Trucks, 2 ea-\$15,994

WILLYS MOTORS INC., Toledo, Ohio Trucks, 343 ea-\$801,9

YALE & TOWNE MFG. CO., YALE MATERIALS HANDLING DIV., Phila., Pa.

wheeled, warehouse, 212 ea-Tractor

Tool Engineers Will Hear How To Plan For Profit

Theme for the annual meeting of the American Society of Tool Engineers April 18-22 in Milwaukee will be "Planning for Profit."

Thirteen technical sessions will be devoted to cost and profit planning, and a two-day seminar will study manufacturing cost control. A joint session with the American Society of Mechanical Engineers is scheduled for April 21, with papers presented by ASME members.

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In 1907 Tung-Sol produced the Multiplex, the first successful electric headlamp. Today, dual Vision-Aid headlamps and new Vision-Aid headlamps with Spotlight Low Beam set performance standards throughout the world, Tung-Sol Electric Inc., Newark 4, N. J.



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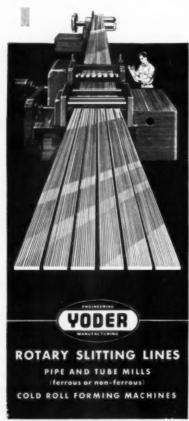
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ON OUR WASHINGTON WIRE

Closing of some military bases may be called off. The shutdowns were ordered by the Army and the Navy to weed out obsolete plants and save money.

All told, the Navy would shut down 30 installations and the Army four posts. About 12,000 civilian workers in 18 states would go off the Government payrolls.

Now Rep. S. S. Stratton, D., N.Y., is backing legislation that would take away from the Pentagon the right to close down surplus installations. Under the Stratton plan, the proposed shutdown of any base could be cancelled by a simple resolution on the part of either Senate or House. This is one of the many reasons why it costs about \$80 billion a year to run the Federal Government.

A move is developing in Congress to keep up the Development Loan Fund and pare down the gift phases of U.S. foreign aid. The fund has been given some \$600 million so far for loans. Ike wants to retain this level and increase foreign aid grants by about \$700 million. But many Congressmen favor boosting the loan fund to \$1 billion, and shaving the grants.

House leaders and Treasury experts tag as "impractical" the Herlong-Baker tax cut bill. They worry over the loss of revenue (\$18.5 billion over the next five years) spelled out in the bill. But other tax experts point out the Government would gain much new revenue, due to new investment incentives. Bill calls for realistic depreciation of plant and equipment, plus cuts in income taxes.

In the Senate, concern mounts over Red gains in world trade. A subcommittee will probe deeply into the matter soon. There's no longer any doubt the Reds are winning the economic war at this point. Congress, it is felt, will have to lift roadblocks, such as double taxation, to U.S. investment abroad.

President Eisenhower's proposals to the Congress for labor reform stress the need for driving out racketeers and for safeguarding union dues from improper uses. But Mr. Eisenhower also calls for prohibitions on secondary boycotts and on so-called blackmail (coercive) picketing.

These points (secondary boycotts and blackmail picketing) are sore spots with union officials. A major battle is brewing over whether or not these items should be included in a reform labor law.

You can expect the Eisenhower Administration to do all it can to talk management and labor out of higher prices and higher wages this year. But trying to convince businessmen and labor leaders of the need for a "hold-the-line" policy in prices and costs won't be easy.

Government efforts to talk businessmen and labor leaders out of price and wage advances in recent years tend to succeed with management and fail with labor leaders. There are, of course, exceptions on both sides. But Washington has found it's far easier to persuade business executives to cooperate with government goals than it is to convince labor leaders.

Justice Department is preparing a major offensive against big industry. First step is a broadscale attack on two basic industries—steel and automobile making. It could result in the breakup of U. S. Steel and General Motors into smaller, independent units.

Justice Department in opening grand jury investigations against the steel industry (in San Francisco) and General Motors (in New York) is laying the groundwork for a full-scale attack on bigness as such ("undue concentration") in major industries, and on industrial pricing practices. It may well spill over into aluminum, chemicals, and other basic materials producing segments of the American economy.

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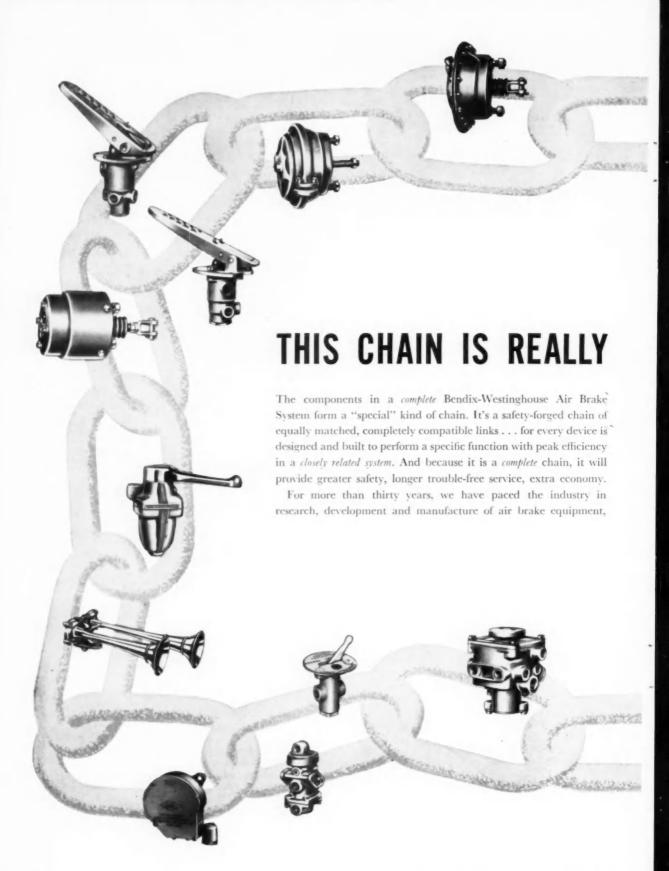
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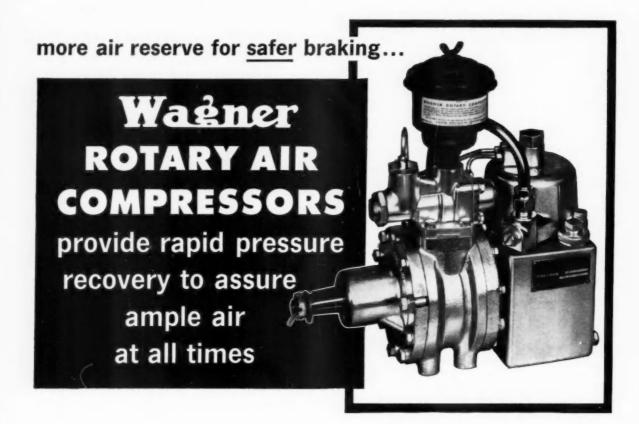
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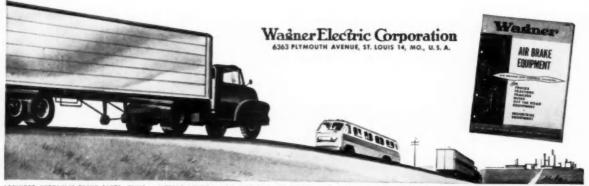
Wagner Rotary Air Compressors have what it takes to deliver a constant and smooth flowing supply of compressed air at all times. Their ability to provide rapid pressure recovery means safer stopping power even under the most severe braking conditions.

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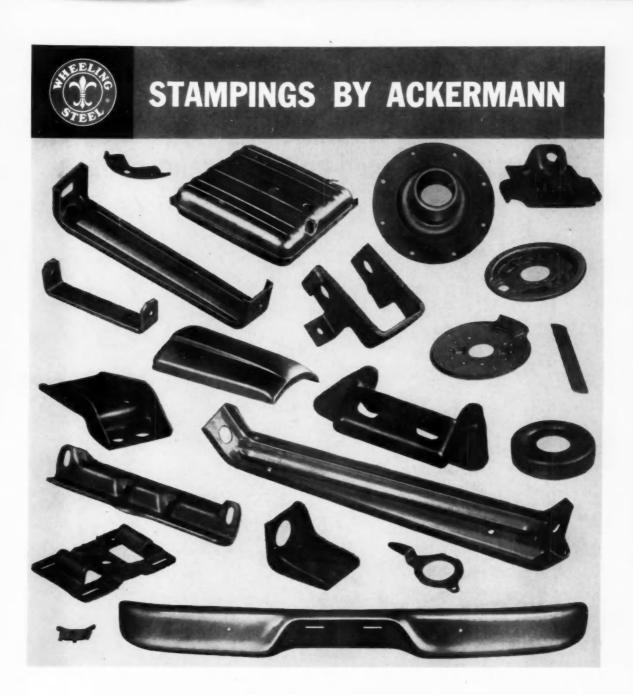
Field tests and fleet records show that Wagner Rotary Air Compressors help keep air brake maintenance costs down. Their exceptionally long service life and easy, infrequent preventive maintenance adds up to greater economy... greater performance... greater safety. Available in either 9 C.F.M. capacity, air or water cooled; or 12 C.F.M. capacity, water cooled.

For full information about these compressors and details on complete Wagner Air Brake Systems and Equipment for trucks, trailers, tractors, buses and off-the-road equipment, send for your free copy of Wagner Catalog KU-201.

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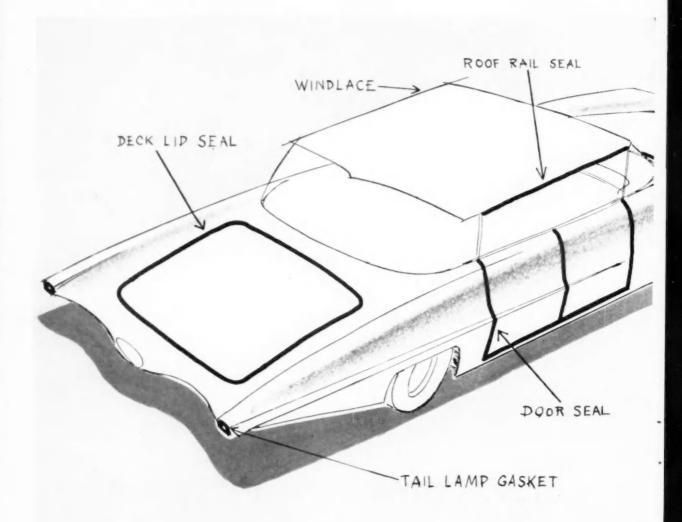
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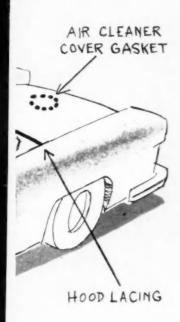
IT'S WHEELING STEEL

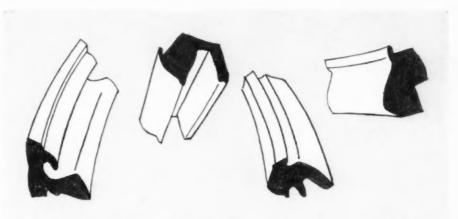
For improved body seals at lower cost: extruded closed-cell neoprene sponge



You can now reduce tooling costs . . . improve weather resistance . . . and eliminate water absorption in deck-lid, door, and roof-rail seals. Recently developed, extruded closed-cell neoprene sponge can be produced in a variety of cross-sections. It makes new approaches to body seals possible, and can provide substantial savings in production costs. The exceptional weather and ozone resistance of neoprene makes it the logical choice for cellular body seals.

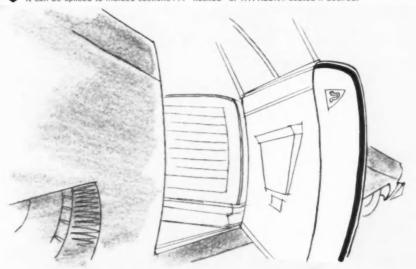
Low water absorption is assured due to the characteristic closed-cell structure. Because the small hollow cells in the sponge *are not* interconnected, a veneer or coating is unnecessary . . . tighter radii can be turned without wrinkling . . . the need for corner molds is eliminated. For additional information, write for your copy of the new booklet, "Extruded Closed-cell Neoprene Sponge." E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. AI-2, Wilmington 98, Delaware.





- ↑ Closed-cell neoprene sponge can be extruded in a variety of cross-sections, and good dimensional control can be maintained.
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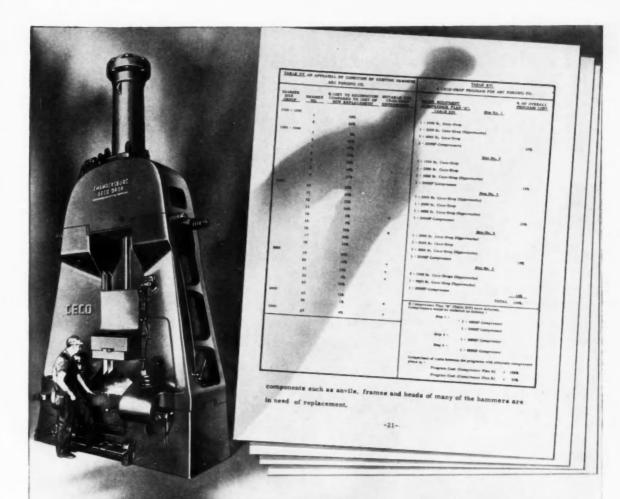
The gleam in her eye reflects the brilliant beauty of stainless

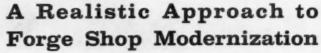
The gleam in her eye reflects the brilliant beauty of stainless steel trim. The gleam in his eye reflects the protection that only stainless steel provides. Helps keep that "showroom look" for years.

Specify Uniloy stainless steel, produced by steelmakers who have been making specialty steels since 1884. This backlog of experience explains Uniloy's gleaming finish, why it is so easy to fabricate. For prompt delivery of Uniloy stainless steel rolled to your exact specifications, write or call our nearest sales office or warehouse.



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During the past few years, mounting competition has caused forge shop managers to seek ways to further increase production and reduce costs. A number have scrapped their old board hammers replacing them with Ceco-Drops, the modern piston-lift gravity-drop hammer. These shops have thus placed themselves in a position to get more business—and they are getting it! • A wealth of helpful information is available in Chambersburg's new 28 page forge shop modernization bulletin. Based on studies made in prominent forge shops, this publication assists you to formulate your own step-by-step modernization program. Write for a copy today.



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This self-propelled oil field vehicle is designed for top dependability in some of the roughest, toughest work you'll find. Loads are heavy, often excessive. Dirt and grit are always present, and the equipment must be ready for prolonged and uninterrupted service any time of the night or day.

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> The vehicle shown is one of a type manufactured by Fred E. Cooper, Inc., of Tulsa, Oklahoma, employing Spicer Series 1700 heavy-duty drive shafts. Cooper also builds a





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AGRICULTURE: Universal Joints, Propeller Shafts, Axles, Power Take-Offs, Power Take-Off Jaints, Clutches, Forgings, Stampings.

MARINE: Universal Joints, Propeller Shafts, Gear Boxes, Forgings, Stampings. Many of these products manufactured in Canada by Hayes Steel Products Limited, Merritton, Ontario.



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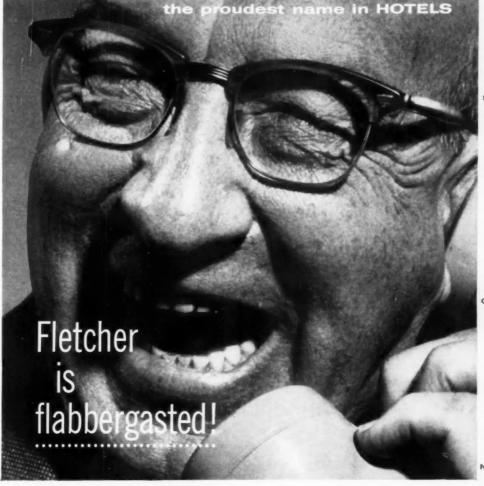
FRENCH LICK, Ind. RAPID CITY, S. D. SIOUX CITY, Iowa SIOUX FALLS, S. D. CEDAR RAPIDS, lowa

SOUTH LOUISVILLE DALLAS

(opens early 1959) AUSTIN MOBILE

WEST COAST SAN FRANCISCO LOS ANGELES PASADENA PORTLAND, Oregon

(opens fall 1959) CANADA MONTREAL TORONTO NIAGARA FALLS, Ont. HAMILTON, Ont.



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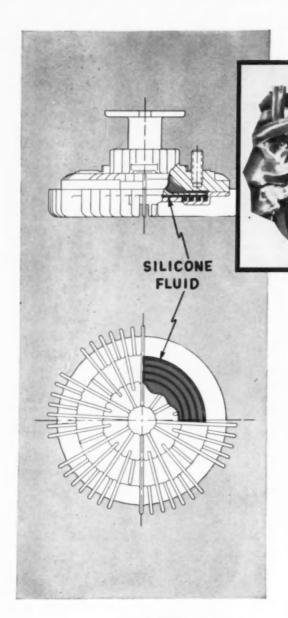
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Experience—the added alloy in Allegheny Ludium tool steels



Careful addition of sulfur to melt guarantees typical sulfide distribution, as shown in photomicrograph of longitudinal specimen of EZ MACHINING tool steel.

Sulfur addition to melt held to narrow range in Allegheny Ludlum's EZ MACHINING GRADES

Uniform, finely-distributed sulfides mean uniform machining, uniform high finish, uniform long tool life order after order

Adding sulfur, actually an impurity, to a tool steel melt to make it free-machining must be done with care and precision. That's why Allegheny Ludlum maintains an extremely close average range in adding sulfur to its EZ MACHINING grades. But mere range, however narrow, is not enough. A-L has developed special techniques in adding sulfur and nucleating agents to produce the uniform, finely-distributed sulfides that characterize good free-machining tool steels.

A-L's extra care means you can standardize your machining operations from piece to piece and order to order. This reproducibility is reflected in uniform machining; uniform high finish; uniform long tool life.

For example, in the production of hobs these machining properties in Allegheny Ludlum's EZ MACHINING steels minimize the costly "backing off" operation for back clearance of multiple teeth, eliminating complicated extra heat treatment. Lower residual stresses are set up, because the steel has a lower resistance to the cutting action. Naturally, hobbing is only one of the situations where these free-machining characteristics can benefit you.

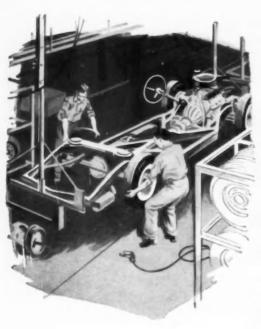
Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier. ALLEGHENY LUDLUM STEEL CORPORATION, Oliver Building, Pittsburgh 22, Pa. Address Dept. AI-14

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Tool Steel warehouse stocks throughout the country...Check the yellow pages every grade of tool steel...every help in using it

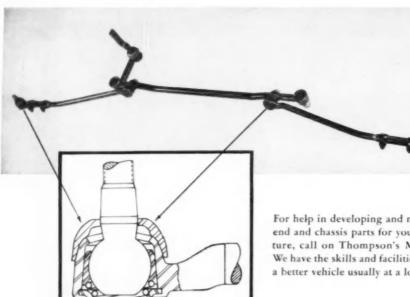




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GREASED-FOR-LIFE STEERING LINKAGE...

New developments in chassis and front end parts have been coming from Thompson's Michigan Division for many, many years. Almost every make of passenger car, truck, farm tractor or off-the-road vehicle performs better because of Thompson contributions. Shown here is another Thompson development ready now for manufacturers to use in models to come.



Completely assembled, GREASED-FOR-LIFE steering linkage for future passenger car application.

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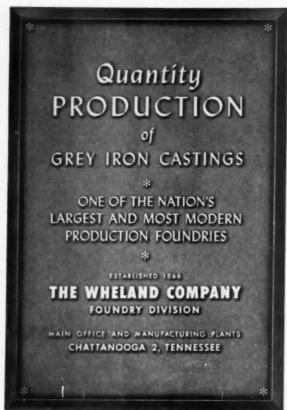
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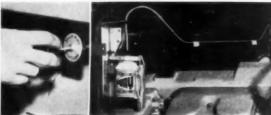


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Old stuff? Perhaps, but it always bears repeating. For it's worth remembering that stainless steel not only resists scratching but is also resistant to rust and corrosion, is extra strong and doesn't peel. What's more it's beautiful—and it stays beautiful.

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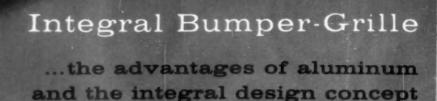


Integral Aluminum Bumper-Grille



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Savings in piece costs and tooling . . . reduced front end weight . . . versatility in design . . . lasting, rustfree, sales appealing beauty—those are major benefits offered by an extruded aluminum integral bumper-grille.

In a bumper-grille such as sketched on the front side of this page, the versatile aluminum extrusion process permits a number of design and fabrication benefits. A partially cost complete section can be obtained without preliminary forming or drawing operations. Thicker integral stiffeners can be incorporated on the unexposed inner portions of the bumper. Non-uniform metal distribution can be easily designed in the section to take care of any peculiar loading or attaching situation and permit minimum weight and cost.

In the grille area, air intake openings can be provided

In the grille area, air intake openings can be provided by simple perforated louvers or other interesting shapes blanked in the vertical constant section of the aluminum extrusion. For decorative or functional purposes, rubber, plastic or metal inserts may be applied to any portion of the exposed bumper-grille face by using integrally extruded dovetails for attachment simplicity.

Conventional forming processes can be used for closure on bumper ends. If more complex wrap-around effects are desired, hot forming techniques can be readily adapted. The hot forming process for aluminum extrusions removes previous styling limitations formerly thought of in connection with extrusions for bumpers and similar complex

In addition to the aluminum extrusion approach, aluminum stampings or a combination of stampings and extrusions may be used in the integral design approach. Also, in addition to the bumper-grille area, the integral design with aluminum concept offers important potentials in areas such as hood and grille, deck lid, rear quarter panel and wheels.

panel and wheels.

For more information on the applications above and on aluminum mill products and fabricated aluminum parts and trim, call on Reynolds Aluminum Specialists. They are at your service to help you get the very most from the aluminum you use. Reynolds Metals Company, Fisher Building, Detroit 2, Michigan or P. O. Box 2346-MW, Richmond 18, Virginia.

FREE LITERATURE

Rotary Cutting Tools

A complete line of cutting tools is described in a catalog prepared by Rico Tool Co. Included are solid carbide end mills, die-sinking cutters, keyseat cutters, grinding burrs, etc.

Presetting Machine

The step-by-step operation of the MT-10062 presetting machine for flareless fittings is fully explained and illustrated in a flyer sheet available from The Weatherhead Co.

OBI Presses

Minster Series 1 limited specification type OBI presses in capacities from 35 to 75 tons are described and illustrated in a four page bulletin. Minster Machine Ca.

Couplings

Bulletin Q.S.R.-58, 20 pages, describes the extensive line of Quick-Seal couplings for hydraulic and pneumatic applications. *Titeflex*, *Inc.*

Thread Attachment

Reed Rolled Thread Die Co. has published a data sheet covering a small size thread rolling attachment for use on small type automatic screw machines.

Steels and Alloys

A high temperature steel and alloy deta card is available from the Allegheny Ludlum Steel Corp. The card lists 19 metals used in high temperature applications, such as a variety of parts in jet engines, gas turbines and turbo-superchargers and missiles.

Pushbutton Actuators

The 12MA series of pushbutton actuators for basic switches is the subject of data sheet 155, just released by Micro Switch, a Div. of Minneapolis-Honeywell Regulator Co.

Overhead Valve Engines 8

Hercules Motors Corp. has issued three bulletins describing 4, 6, and 3 cylinder models of interchangeable Hercules engines designed for use with gasolines, kerosene, LPG and natural gas.

(Please turn page)

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Nylon Parts

A four page brochure is available on Nylasint nylon parts which are components formed by cold pressing and oil sintering nylon powders in a process similar to that used in forming powdered metal parts. Property and application data are included. Halex Corp.

Truck Attachments

A four page folder, detailing a complete line of attachments for powered industrial trucks, has been prepared by The Elwell-Parker Electric Co. The literature describes 30 different attachments.

Turret Type Machines 11

A complete line of Turret type drilling, tapping and boring machines are described and illustrated in a four page bulletin prepared by Burg Tool Manufacturing Co., Inc. All machines feature power indexing to the turret and pre-selective spindle speeds for each spindle.

Cylinder Accessories

A catalog sheet listing cylinder accessories available for the clevismounting of a line of air and hydraulic cylinders is offered by the Miller Fluid Power Div., Flick-Reedy

Rotating Heads

Rotating drill heads and tapping heads by Wisconsin Drill Head Co. are described in a four page bulletin. Specifications and operational data are included.

Protective Coatings

Bulletin 100, four pages, on protective coatings has been released by the Carboline Co. Physical properties as well as chemical resistances are

Ceramic Tool Components

Bulletin 116, four pages, describes a line of high temperature ceramic tool components, including a wide variety of bushings, washers, discs, plates, rods, and v-blocks. Duramio Products, Inc.

Cellular Materials

An eight page pamphlet describing the properties and applications of industrial cellular rubber and plastics has been published by B. F. Goodrich Co. The book covers sponge rubber, neoprene, silicone sponge, Cell-tite and cellular vinyl.

Marking Equipment

Automatic roll marker and manual marking devices for many product marking and identifying requirements are pictured in Catalog HA-59. New Method Steel Stamps, Inc.

Gear Finishing Units

Two rotary external gear finishing machines are detailed in four page brochure 870-A-58. These units shave gears by cutting away material in tiny chips with a serrated rotary cutter to provide a high surface finish. Michigan Tool Co.

Tube Form Mountings

Bulletin 713 describing full bonded tube form mountings and Dynaflex joints, engineered for vibration and shock control, is available from Lord Mfg. Co.

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FREE LITERATURE— continued

Inclinable Presses 20

Bulletin 52112 illustrates and describes the Warco line of OBI presses. Capacities are from 40 to 200 tons. The Federal Machine & Welder Co.

Casting Alloy

Design specifications, mechanical properties and casting techniques for TENS-50 high strength aluminum casting alloy are contained in a brochure available from Navan Products, Inc.

Tubing Chart 22

Peter A. Frasse & Co., Inc., has made available a tubing chart which explains the method for calculating the tube size required to machine to a finished dimension. The chart gives examples to follow and explains differences in OD and ID chucking.

Boring Units 2

A 16 page catalog covering a line of micro-adjustment boring units for use with throwaway inserts has been prepared by Valenite Metals.

Speed Drives 24

Catalog WRB-58, four pages, describing the operation and application of wide-range, adjustable-diameter, wedge-belt sheaves is available from the American Pulley Co. All installation and mounting dimensions are listed for various sheaves.

Drives 25

Bulletin 314 gives condensed specifications on all Twin Disc friction and fluid drives. There are 20 pages of engineering data, schematics, dimensions and other pertinent information. The range of products include: friction clutches, power take-offs, reduction gears, torque converters, and marine gears. A page is devoted to each unit. Twin Disc Clutch Co.

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FREE LITERATURE-Continued -

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L-Head Engines

26

Revised two-page bulletins E-128, E-129 and E-130 have been issued by Hercules Motors Corp. covering three 4-cylinder L-head gasoline engines.

Parts Facilities

27

Facilities for producing forged and stamped parts for missile and rocket application are described in a six page folder entitled "Countdown Coordination" available from Transue & Williams Steel Forging Corp.

Mill Products

28

A complete listing and description of Kaiser Aluminum's mill products are contained in a fully illustrated 24 page booklet available from Kaiser Aluminum & Chemical Sales, Inc.

Strain Gages

29

A catalog of SR-4 strain gages, instruments and accessories has been released by the Electronic & Instrumentation Div. of Baldwin-Lima-Hamilton Corp. Complete electrical and physical specifications of over 250 types are included.

Control Valves

30

Bulletin 581 describes Hunt "Slim Line" control valves. The valves are 1 in. thick by 3 in. wide; mount on any machine, and are easily manifolded into compact control centers. Hunt Valve Co.

Power Protector

Eight page booklet GEA-6527 provides detailed information on the application, features, and operation of LB-1 power protectors which are designed for heavy duty commercial uses, 480 volts-AC and below. General Electric Co.

Nickel Alloy Wire Cloth 32

A 15 page booklet describes the physical advantages of wire cloth and indicates the range of weaves and sizes available for various purposes. Mechanical properties of "A" Nickel, Monel, nickel-copper alloy, Incoloy iron-nickel-chromium alloys are given. The International Nickel Co., Inc.

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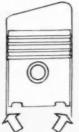
cool piston with greater area of conductivi

promised strength for long-life durability suggest an immediate test for your engine.

Engineered for 20% Greater Heat Conductivity

GREATER DURABILITY No Compromise with Strength in Design

superiority is outstanding in the Zollner "Clear-O-Matic" Piston. The expertly engineered design of this great piston development incorporates vitally desired performance advaned expansion control feature. Clear-O-Matic is a remarkably for heat dissipation. This greater section provides uncom-No other piston provides Clear-O-Matic advantages. We



STEEL TENSION MEMBER

Anchored only at pin bosses and cast in positive contact with/ I.D. of piston skirt.

Automatically maintains uniform effective skirt clearance at all temperatures.



COOL PISTONS

20% greater section for heat conductivity.

DURABILITY

Greater section above pin bosses provides uncompromised strength with long life.

T.M. Reg. Pat. A

Advanced Engineering

Precision Production

Cooperation with Engine Builders

ZOLLNER

PISTONS

ZOLLNER CORPORATION . Fort Wayne, Indiana

Circle 102 on Inquiry Card, for more Data



Preloaded Double Row Bearings Solve Fretting Corrosion Problem In Electric Clutch!

CUSTOMER PROBLEM:

Fretting corrosion of automobile air conditioner electric clutch bearings due to engine vibration. Application requires compact bearing design and positive lubricant sealing.

SOLUTION:

N/D Sales Engineer, working with the manufacturer, suggested replacing two single row bearings with one internally preloaded New Departure Double Row ball bearing with shield and Sentri-Seal. The preloaded angular contact construction of these New Departures offered maximum resistance to combined radial and thrust load deflections, plus freedom from

effects of engine vibration. Problem of fretting corrosion was eliminated by producing bearings with accurately determined internal compression. Lubrication of bearing was assured for life by New Departure's exclusive Sentri-Seals . . . dirt was sealed out under extremely contaminating conditions. In addition, the compact size of these double row bearings eliminated a tough assembly problem . . . and provided savings in both space and costs.

When you're faced with a bearing problem, why not call on New Departure. Chances are there's a precision N/D high production bearing that will solve it. For more information, write Department C-2.

Replacement ball bearings available through United Motors System and its Independent Bearing Distributors



DIVISION OF GENERAL MOTORS, BRISTOL, CONN.

NOTHING ROLLS LIKE A BAL

